

WORLD  
UNLIMITED  
ACES

HOT CONCEPT 30 SX HELI

48120

August 1991

MODEL

# AIRPLANE

THE PREMIER R/C MODELING MAGAZINE

NEWS

ACES: IRON EAGLE

EXPLOSIVE IIII  
HOLLYWOOD R/C!

Construction:  
FRENCH HEMIPTERE

JR X-347  
—3 Radios in 1!

How To Tow a Glider!

MINIMAX and MAGIC Sailplanes  
—Which is for you?

USA \$2.95 Canada \$3.75



Engine Review:  
YS F-120—fearsome 4-stroke!



# MODEL AIRPLANE

THE WORLD'S PREMIER R/C MODELING MAGAZINE

## NEWS

### FEATURES

- 37 Weston Aerodesign Magic**  
by Mike Lachowski  
A Field & Bench Review  
—simplicity of design  
for sophisticated  
soaring
- 42 R/C Unlimited Reno-Style Races**  
by Rob Wood  
—preparations  
heat up
- 49 Minimax Enterprise 700**  
by David Garwood  
A Field & Bench Review  
—high-performance,  
low-cost sailplane
- 54 Build a Wall Wing Rack**  
by David Garwood  
—save space in your  
shop
- 58 ACES: Iron Eagle III**  
by Rob Wood  
—R/C secrets  
behind the scenes
- 64 Radio Review: JR X-347**  
by John Lupperger  
—a 3-in-1 computer  
radio
- 69 Futaba Acrostar 60**  
by Chris Chianelli  
A Field & Bench Review  
—an innovative  
Swiss aerobat is  
reborn
- 87 Hooked on Towing**  
by Dave Herbert  
—how to glow-tow a  
sailplane



**ON THE COVER:** center—P-51A converted to a "Messerstang" for use in movie "Aces: Iron Eagle III" (shot by Rob Wood from a B-25 that had been modified for camera work). Background: the C-123 and the Zero R/C models used in the movie explode in a fiery midair collision. (Photo by Rob Wood.) Upper right: Concept 30 SX at dusk. (Photo by Dave Herbert.)

- 108 Engine Review: YS F-120**  
by Mike Billinton  
—supercharged  
4-stroke

### HELICOPTER SECTION

- 91 Contents**
- 93 Kyosho Concept 30 SX**  
by Dave Herbert  
A Field & Bench Review  
—heli upgrade  
opens eyes
- 98 Rotary-Wing Roundup**  
—manufacturers  
share their latest  
products

- 101 Helicopter Challenge**  
by Craig Hath  
—aerobatics that  
combine maneuvers
- 104 Helis at Toledo '91**  
by Jerry Hicks  
—what's new at the  
largest aeromodeling  
show

### CONSTRUCTION

- 29 Sport-Scale Hemiptere**  
by Laddie Mikulasko  
—an unconventional  
French design

### COLUMNS

- 16 Air Scoop**  
by Chris Chianelli  
—"I spy for those  
who fly"

### COLUMNS

- 20 Fifty Years Ago**  
by Chris Chianelli
- 22 How To: Make a Glow-Plug Clip**  
by Randy Randolph
- 74 Floating Around**  
by John Sullivan
- 84 About Those Engines**  
by Joe Wagner
- 112 Small Steps**  
by Joe Wagner
- 128 Golden Age of Radio Control**  
by Hal deBolt

### DEPARTMENTS

- 6 Editorial**
- 8 Airwaves**
- 12 Hints & Kinks**  
by Jim Newman
- 24 Pilot Projects**
- 122 Product News**
- 132 Plans Mart**
- 134 Name That Plane**
- 135 Club of the Month**
- 138 Ad Index**



# EDITORIAL

by TOM ATWOOD



Editor Tom Atwood (left) and contributor David Baron (right) give scouts some introductory stick time at an April Wolf Pack Sunday cub scout meeting in Connecticut.

**A**T A RECENT Wolf Pack Sunday cub-scout meeting at the Ed Strang Scout Reservation in Torrington, CT, local R/C fliers brought R/C excitement to a few hundred scouts and their families. The R/C air show featured a welcoming banner tow by Bob Beringer, aerobatic flight by a 1/3-scale Laser (Art Freund), heli demos (Ralph Dalusio and Ray St. Onge), Sopwith Camel and Fokker triplane exhibitions (Al Ehrenphels and Don Button) and a demo of "Snoopy's Flying Doghouse" (Dick Wilkins).

On a second flight line, David Baron and I gave scouts some stick time on a giant-scale Florio Nifty Fifty trainer and a modified Goldberg Electra (see photo). R/C pilot Bob Hastings managed the line of eager cub scouts! After the air show, we moved the training queue to the flight line, and by dusk, more than 50 cub scouts had "flown R/C." It was a lot of fun, and we thank Joe Majoros, who organized Wolf Pack Sunday, and Bill Jensen, who coordinated the air show. Has your club held such a program?

As I mentioned in my April "Editorial," Air Age sent more than 10,000 R/C magazines to "Desert Storm" earlier this year. To the nearly quarter-million service men and women still in Saudi Arabia and the surrounding area at the time of this writing, Air Age has sent another 100,000 back issues of R/C magazines—primarily *Model Airplane News*. These shipments have arrived at distribution points in King Khalid Military City, Dārān, and Riyadh, Saudi Arabia. Many copies also went to Adana, Turkey, and from there by military truck to our service people in Northern Iraq.

These donations—valued at well over \$300,000—were made possible by the efforts of several organizations. We thank World Color Press Inc. (of New York City), which donated the packing for many tons of magazines; the USO for its help in coordinating the first shipment; and the Defense Logistics Agency (DLA), for accepting the donations and speedily shipping the magazines to Saudi. Special thanks goes to Captain Chris Zaner at Dover Air Force Base. Do any readers have modeling friends in Saudi? We'd appreciate pictures of the magazines being read there by our troops.

Don't miss our Top Gun '91 coverage in the next issue. Finally, don't forget to send in your entry to the Second Great American Design Contest by August 1!

## MODEL AIRPLANE NEWS

THE WORLD'S PREMIER R/C MODELING MAGAZINE

Group Publisher	LOUIS V. DeFRANCESCO JR
Publisher	DR. LOUIS V. DeFRANCESCO
Associate Publisher	YVONNE M. MICIK
Editor-in-Chief	TOM ATWOOD
Associate Editors	CHRIS CHIANELLI GERRY YARRISH
Copy Director	LYNNE SEWELL
Copy Editor	KATHERINE TOLLIVER
Assistant Copy Editors	LAURA M. KIDDER DEBORAH S. GOLDEN
Art Director	ALAN J. PALERMO
Associate Art Director	MARY LOU RAMOS
Assistant Art Directors	BETTY KOMARNICKI JONATHAN T. KLEIN MATTHEW J. LONGLEY
Art Assistants	STEPHANIE L. WARZECHA ALLYSON NICKOWITZ
Promotional Artist	ROBIN DEMOUGEOT
Staff Photographer	YAMIL SUED
Systems Manager	ED SCHENK
Systems Assistants	SALLY WILLIAMS WILLIAM MACK JACKIE MOSIER STEVE TRAUTLEIN
Director of Marketing	GARY DOLZALL
Circulation Manager	KATHLEEN RHODES
Production Coordinator	MARY M. REID
Advertising Sales Director	JASON STEIN
Advertising Account Executive	JULIA K. PEMBERTON
Advertising Account Representative	MICHAEL S. STANKIEWICZ
Advertising Traffic Assistant	KYRA MATERASSO
Advertising Coordinator	SHARON WARNER

**SUBSCRIPTION PRICES:** U.S. & Possessions (including APO & FPO): 1 year (12 issues), \$24.95; 2 years (24 issues), \$45.95. Outside U.S.: 1 year, \$34.95; 2 years, \$65.95. Payment must be in U.S. funds.

**SUBSCRIPTION INQUIRIES:** call 1-800-435-0715.

**MODEL AIRPLANE NEWS** (ISSN No. 0026-7295) is published monthly by Air Age, Inc., 251 Danbury Rd., Wilton, CT 06897. Connecticut. Editorial and Business Offices, 251 Danbury Rd., Wilton, CT 06897. Phone: 203-834-2900. FAX: 203-762-9803. Y.P. Johnson, President; G.E. DeFrancesco, Vice President; L.V. DeFrancesco, Secretary; Yvonne M. Micik, Treasurer. Second Class Postage Permit paid at Wilton, Connecticut, and additional Mailing Offices. Copyright 1991 by Air Age, Inc. All rights reserved.

**CONTRIBUTIONS:** To authors, photographers, and people featured in this magazine, all materials published in *Model Airplane News* become the exclusive property of Air Age, Inc., unless prior arrangement is made in writing with the Publisher. The Publisher assumes no responsibility for unsolicited material. Only manuscripts and supporting material accompanied by a SASE will be returned.

**ADVERTISING:** Advertising rates available on request. Please send advertising materials, insertion orders, etc., to *Model Airplane News*, Advertising Dept., Air Age, Inc., 251 Danbury Rd., Wilton, CT 06897. Phone: (203) 834-2900. FAX: (203) 762-9803.

**CHANGE OF ADDRESS:** To make sure you don't miss any issues, send your new address to *Model Airplane News*, Subscription Dept., P.O. Box 428, Mount Morris, IL 61054, six weeks before you move. Please include the address label from a recent issue, or print the information exactly as shown on the label. The Post Office will not forward copies unless you provide extra postage. Duplicate issues cannot be sent.

**POSTMASTER:** Please send Form 3579 to *Model Airplane News*, P.O. Box 428, Mount Morris, IL 61054.

PRINTED IN THE U.S.A.



# AIRWAVES

WRITE TO US! We welcome your comments and suggestions. Letters should be addressed to "Airwaves," *Model Airplane News*, 251 Danbury Rd., Wilton, CT 06897. Letters may be edited for clarity and brevity, and each must include a full name and address or telephone number so that the writer's identity can be verified. We regret that, owing to the tremendous numbers of letters we receive, we can't respond to every one.

## SCRATCHING FOR SCRATCH-BUILDING GUIDES

I'm a newcomer to R/C airplanes, and I'm interested in building from scratch, or from a set of plans. Until a few years ago, I owned and operated a cabinet-maker's shop. I still have a generous number of woodworking tools, so I have trouble justifying building "kits" with pre-cut parts. Can you recommend a set of plans/books that would teach me how to

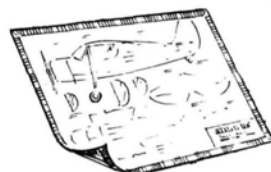
build R/C from scratch? Consider me a beginner to scratch-building.

NICHOLAS L.  
CONDOLUCI  
Eagle Harbor, NY

*Nicholas, most people refer to building from plans as "scratch-building," but some also include designing plans in this definition. With your background, I'm sure you've mastered most of, if not all of, the essential skills you'll need. Three Air*

*Age publications will be particularly useful: "R/C Airplane Building Techniques," by Randy Randolph, and "Control Systems," by Jim Newman. Randolph's book contains all of his Model Airplane News "How To" articles, which our readers have found helpful for so many years. Newman's book is a practical guide to model airplane control systems; he bases it on his study of full-scale control systems and*

*those on giant-scale model aircraft. Although it isn't directly targeted at scratch-builders, Jim Newman's "400 Great R/C Modeling Tips" includes a lot of information that scratch-builders will find useful. Stay tuned for more Air Age books designed specifically for scratch-builders!* TA



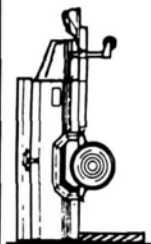
## FLY WITH AEROWAGON

Aerowagon is made of steel to protect your large RC plane. It has a 5 bolt heavy duty axle and is sprung for RC use. Aerowagon is designed for compact cars with stealth aerodynamics to save fuel.

Sizes range inside from 74" to 110" width 59". Base price for the 98" trailer in white is \$1150.00 + freight and crating.

FULLY  
CARPETED

CARRY  
YOUR FUEL  
IN STEEL  
SAFETY

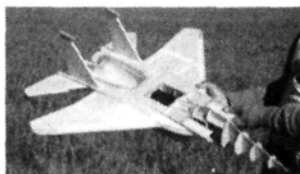


STORES  
UPRIGHT

**SEACOAST AEROWAGON  
AND R.V., INC.**

407 COMMERCE WAY 13-A  
JUPITER, FL 33458  
1-(800)-323-3087





### EAGLE EVOLUTION

I read your article in the December '88 issue about Bob Kress's prototype Baby Eagle. A follow-up report was promised, but I haven't yet seen it. Have I missed it? Could you please write something about it, and tell me where I can get drawings and, perhaps, a model kit?

I hope you will have the time to help me with this. Thanks, in advance.

JESPER ANDERSEN  
Uppsala, Sweden

*Jesper, Bob Kress (of Kress Jets Inc.) has been on the scene for a long while, and he offers a line of interesting, smaller, ducted-fan units, accessories and kits. We saw two at the 1991 WRAM show in NY in February: the F-15 Eagle (see photo) and the new F-16 Falcon. (We picked up a partial kit without wooden parts). Both kits are available, and the F-15 is a simple (for a jet!) balsa, plywood and foam construction. Both kits are designed around the Kress RK-709 Sport unit, but the RK-720 can also be squeezed into the F-15. We plan to cover several of the*

*Kress jets, but meanwhile, if you send \$10 to Kress, they'll send you a plan. (If you later decide to build from a kit, the \$10 will be credited toward its purchase.) Write to Kress Jets, 4308 Ulster Landing Rd., Saugerties, NY 12477. Look for the Kress Jets ad in this issue. TA*

### BACK IN THE SADDLE

Without question, yours is the best R/C airplane magazine available, and I have seen the rest! It's obvious that your main concerns are your readers (even the technical articles don't scare away newcomers like me), and not with advertisers. I

appreciate this very much. Five or six years ago, I had an experience that I think might be common among beginners, and it pretty much grounded me. Then I read your May issue!

When I was in college, my girlfriend (now my wife) bought me an R/C kit. She knew I wanted to get into the hobby, and a local dealer told her that the CG Falcon 56 MK II was a good trainer. It took me three months to build the plane, and no one was more proud of their model than I was of mine on the day I applied the last strip of MonoKote. For weeks, I unsuccessfully tried

(Continued on page 10)



P-51D



**The ultimate Mustang**

100" span

**Sheeted kit \$800.00**

Unlimited race legal.

Custom race airframes available.

Custom 75" span Stiletto \$900.00

**BD 5** 98" span, 62" Length.

**Sheeted kit with engine  
\$800.00**

Midship mounted Quadra Q42H included.

(fan cooled, recoil starter, shaft drive).

for .60 - .90 glow engine and pump. \$425.00

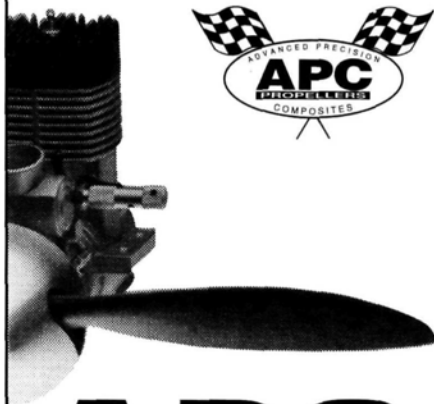


**Sky Aviation (514) 449-0142**

1320 Gay Lussac, suite 106  
Boucherville, P.Q.  
Canada, J4B 7G4

**All prices DELIVERED TO YOUR DOOR.**





# APC PROPELLERS

- Sound Suppression Design
- High Thrust Efficiency
- Long Fiber Advanced Composite Material
- Proven Performance at US Masters, US Nationals, Canadian Nationals, and World Championships

## Sports Sizes

5.7x3, 7x3, 7x4, 7x5, 7x6, 7x7, 7x8, 7x9, 7x10 .....\$1.59 EACH

8x4, 8x5, 8x6, 8x7, 8x8, 8x9, 8x10 .....\$1.79 EACH

9x4, 9x5, 9x6, 9x7, 9x8, 9x9, 9x10 .....\$1.99 EACH

9.5x4.5, 10x4\*, 10x5\*, 10x6, 10x7, 10x8, 10x9, 10x10 ..\$2.29 EACH

11x6, 11x7, 11x8, 11x9 .....\$ 2.49 EACH

12x6, 12x7, 12x8 ... \$ 2.89 EACH

## Reverse Pitch Pusher

9x6\*, 10x6\*, 10x7\*, 10x8\*, 11x6\*, 11x7\* .....\$3.95 EACH

## Competition

7.8x4, 7.8x6, 7.8x7, 9x6.5, 9x7.5, 9x8.5 .....\$3.95 EACH

11x10, 11x11, 11x12, 11x12W, 11x13, 11x14, 12x9, 12x9W, 12x10, 12x10W, 12x11, 12x11N, 12x12, 12x12N, 12x13, 12x13N, 12x14, 12.5x9, 12.5x10, 12.5x11, 12.5x12, 13x9, 13x10 ...\$7.95 EACH

13.5x9\*, 13.5x12.5, 13.5x14, 14x6\*, 14x8, 14x10, 14x12, 14x13\*, 14x14, 14.4x10.5, 14.4x12, 14.4x13\*, 15x8, 15x10, 15x12, 16x8, 16x10, 16x12 ...\$12.95 EACH

\* New sizes

"Contact your local hobby dealer first"  
If he doesn't have what you need, order direct  
from 916-661-6515

Manufactured by Landing Products  
P.O. Box 938, Knights Landing, CA 95645

# AIRWAVES

to get someone to help me to learn how to fly, but I had to go solo. My plane's first flight lasted exactly 5.3 seconds, and it "landed" in more pieces than had come in the box. My hopes were shattered almost as completely.

I sold everything and got out of the hobby—or so I thought. Then, in the May '91 issue, *hope was re-born!* I couldn't sleep for two days! I'm talking, of course, about your review of Ambrosia's R/C flight simulator. I went to the hobby shop to find out about a club (I've moved to a different area since my earlier experience), and I was assured that I'd get all the help I needed. Since I have an IBM computer, imagine my dismay, however, when they told me it would be *next year* before an IBM version would be available. Are there any flight simulators available for IBM computers? I currently own several "real" aircraft flight simulators, but they're altogether different from what I'm looking for. Thanks again for getting me back into R/C. I'm back with a vengeance!

JOHN STONEHAM  
Beaumont, TX

*John, thanks for the nice comments; we hope we've moved a lot of others to take up the hobby as well! We phoned Ambrosia, and the IBM version of Aerochopper should be available in early 1992. Interested readers should note that the Commodore Amiga, Atari ST and Apple Macintosh versions are currently available. For more information, write to Ambrosia Microcomputer Products, 98 W. 63rd St., Suite 371, Willowbrook, IL 60514; telephone: (708)655-0610.*

*A flight-simulator program that's compatible with the IBM is sold by Dave Brown Products, 4560 Layhigh Rd., Hamilton, OH 45013;*

*telephone: (513) 738-1576. This product includes an optional "radio transmitter" that can be plugged into your computer (which, incidentally, can be used to fly the planes in yet another program—Microsoft's famous Flight Simulator, which is sold at most PC software stores). We reviewed an early version of Dave Brown's product in February '85, and a copy of that issue is in the mail to you. We're awaiting a review of the current version. I hope this helps; welcome back to the hobby!*

TA

## BEGINNER'S BOMBER

I'm a newcomer to R/C, but have bought many of your magazines. I've built two airplanes (a trainer and a Piper Cub), but I'm longing for a bomber. I may not have looked that thoroughly, but I haven't seen one in your magazine. I've seen many pictures of B-29s and B-24s, but what about the unforgettable B-17 Flying Fortress? I know about this plane because I have a model and some books on it. I know I won't be able to fly it for another 5 to 10 years, since I'm only 15 years old, but I'd like to build it and have it around just to admire its looks. I need your help to find information on where an R/C plane like this can be found.

NEIL SEILER  
Aurora, IN

*Neil, in my opinion, the Boeing B-17 Flying Fortress is to bombers what John Wayne was to cowboys. There aren't too many people in the world of aviation who wouldn't recognize it. From the old TV series, "12 O'Clock High," to the recent movie, "The Memphis Belle," the popularity of the B-17 continues to grow.*

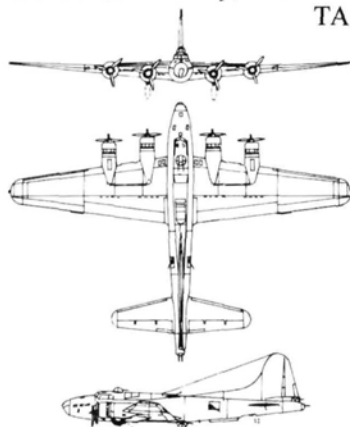
*As an R/C project, I suggest the Royal B-17 kit, which would be perfect for four, .20-size engines. It has a 77 3/4-inch wingspan and 806 square*



inches of wing area, and it would fly well on just four channels. As a smaller project, though, why not try to find the Guillow B-17, stick-and-tissue, rubber-powered kit. It has been available for about three years and, with very little effort (and some minor reinforcement to support the electric gear), it could be converted to a great electric-powered model. The big, 45<sup>3</sup>/<sub>4</sub>-inch-wingspan kit has plenty of vacu-formed plastic parts that simplify construction. That big wing would make it easy to lift the weight of the batteries, and four of the new Hiline miniature electric motors would make it go really well (Hiline Ltd., P.O. Box 1283, Bethesda MD 20827). Take the time to learn to fly, and don't rush your bomber dreams.

For more info on the Royal kit, contact Royal Products Corp., 790 W. Tennessee Ave., Denver, CO 80223. For more information on the Guillow kit, write to Paul K. Guillow Inc., P.O. Box 229, Wakefield, MA 01880. For information on miniature radios and electric power systems that could be used in the Guillow kit, contact Cannon R/C Systems, 2828 Cochran St., Suite 281, Simi Valley, CA 93065.

TA



(Continued on page 124)

## Join the Midwest Air Force . . . with our line-up of Quick-Building Warbirds that fly like Sport Planes!



**New!**

Wingspan: 60" Wing Area: 552 sq. in. Flying Weight: 5-5½ lbs.  
Radio: 4 Channel Motor Range: 35 - 45 2-Stroke, 40 - 50 4-Stroke Kit #172

Coming  
August, 1991



Wingspan: 54" Wing Area: 521 sq. in. Flying Weight: 5-5½ lbs.  
Radio: 4 Channel Motor Range: 35 - 45 2-Stroke, 40 - 50 4-Stroke Kit #170



Wingspan: 54" Wing Area: 521 sq. in. Flying Weight: 5-5½ lbs.  
Radio: 4 Channel Motor Range: 35 - 45 2-Stroke, 40 - 50 4-Stroke Kit #171

Fly a dawn patrol with any of these low-wing taildraggers that are easy to fly. Our series of Fun-Scale™ Class Warbirds provide forgiving handling combined with maneuverability, so you'll enjoy learning to fly a taildragger.

Our Micro-Cut Quality wood components, Success Series Construction Manual and computer-drawn plans leave no room for questions. Building is speedy due to the jig-lock fuselage, D-tube wing construction, and all sheet tail surfaces.

Slip "the surly bonds of earth" with these classic warbirds. Visit your local hobby shop today and ask for the Midwest Fun Scale Class Warbirds!

**MIDWEST  
PRODUCTS CO., INC.**

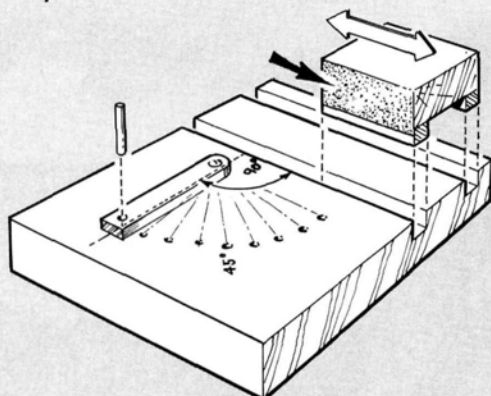
400 S. Indiana St. Hobart, IN 46342 (219) 942-1134  
©1991, Midwest Products Co., Inc. #4 91-150  
Fun-Scale™ of Dynaflyte, Inc.



# HINTS & KINKS

Model Airplane News will give a free one-year subscription (or one-year renewal if you already subscribe) for each idea used in "Hints & Kinks." Send a rough sketch to Jim Newman, c/o Model Airplane News, 251 Danbury Rd., Wilton, CT 06897. BE SURE YOUR NAME AND ADDRESS ARE CLEARLY PRINTED ON EACH SKETCH, PHOTO AND NOTE YOU SUBMIT. Because of the number of ideas we receive, we cannot acknowledge each one, nor can we return unused material.

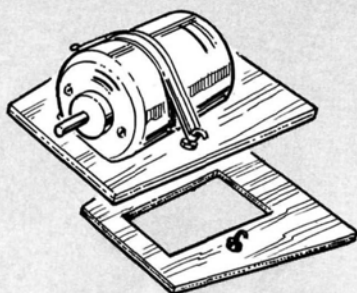
by JIM NEWMAN



## SANDING JIG

This is a great tool to have when you want to sand spacers, uprights and diagonals. Cut a 12x18-inch base out of a good-quality, solid plywood or particle board. Toward one end of it, cut two  $\frac{3}{8}$ x $\frac{3}{8}$ -inch slots that will guide the sanding block. Attach a 5-inch pivoting bar as shown, and drill holes into the base at 5-degree intervals so that the bar can be locked into position at these points. Perhaps the bar should be locked with a thumb nut to allow it to be locked at angles that have been "copied" with a carpenter's adjustable square and transferred to the jig. Note how the sandpaper facing goes below the top of the base.

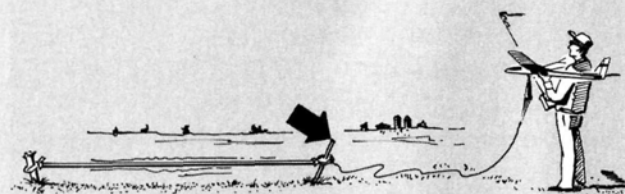
A. Van Eeden, Harare, Zimbabwe



## ELECTRIC-MOTOR MOUNT

For this job,  $\frac{1}{8}$ -inch lite-ply would be suitable for engines of up to .05 size. The motor nests snugly in the rectangular hole and is secured by rubber bands that are hooked onto small J-bolts. You can taper this handy mounting plate to fit nose contours, too.

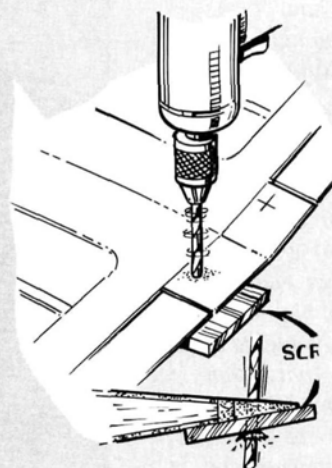
Mitchell Chin, Tappan, NY



## HIGH-START "SLIP-STAKE"

This slip stake (arrowed) keeps the rubber at the correct tension for launching while you leisurely, without straining, hook up the chute and pick up the transmitter. Step back, and pull to release the stake.

R.J. Longenecker, Davenport, IA



## SPLINTER-FREE HOLES

Before drilling through a wing's trailing edge—or anything else for that matter—clamp a piece of scrap wood tightly against the underside of the piece you plan to drill. It will prevent the wood from splintering when the drill comes through.

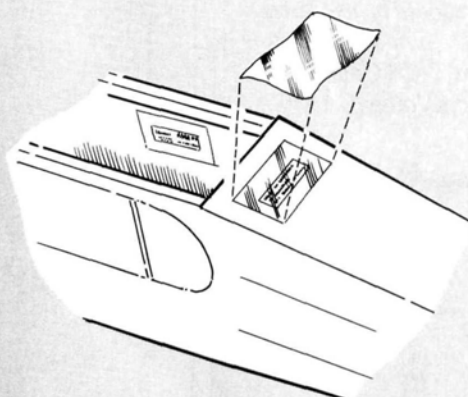
Brad Greenwood, Atchison, KS



## BEVEL NYLON SCREWS

Here's a great way to taper the ends of wing bolts after you've shortened them. Twist them a couple of times in a pencil sharpener.

Mike Johnson, Decatur, IN



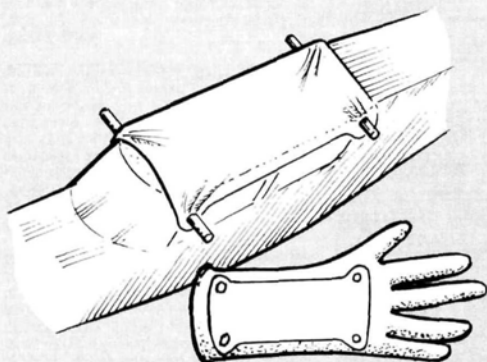
## "INDESTRUCTIBLE" LABEL

AMA rules require that you stick an identity label somewhere on your model. Add your AMA number to one of your printed address labels, then trap it under clear MonoKote or a similar covering film. If you put the label behind the windshield or under the stabilizer, it will be visible, but it won't disfigure a nice-looking model.

Bob Moffat, Viscount, Saskatchewan, Canada

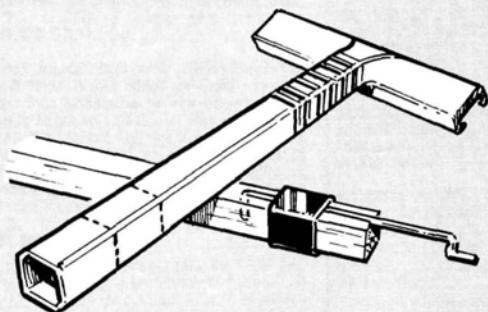


## HINTS & KINKS



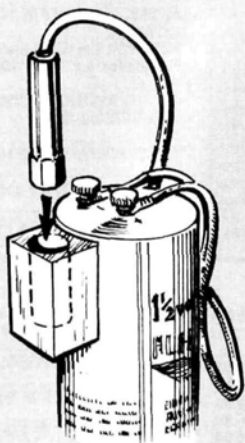
### COVER THAT COMPARTMENT!

Many modelers carefully cover their engine before hanging their model in the shop, but few take the time to cover the radio compartment. Make this simple cover by cutting a rubber glove as shown, and loop its corners over the wing-attachment dowels.



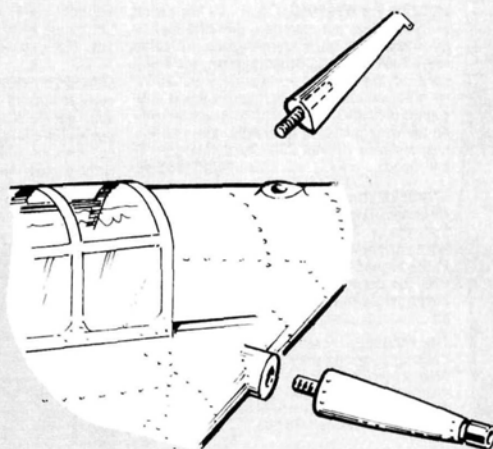
### PUSHROD RETAINERS

Cut a 1/2-inch piece out of the handle of a Bic® disposable razor. Epoxied over the wire extension of a 1/4-inch-square balsa pushrod, it's a great retainer.



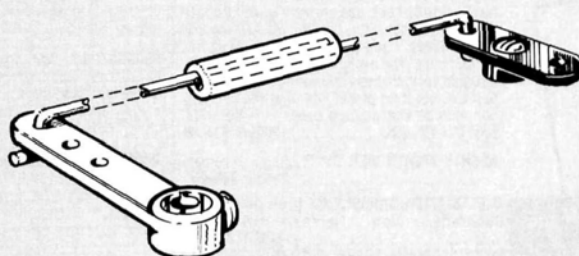
### GLOW-PLUG CONNECTOR PARKING

You can safely park your glow-plug connector in a drilled wooden block that has been taped or glued to the side of your battery. With this simple device, you'll be able to keep your connector out of the dirt (which adversely affects the contacts) and dew (which causes shorts).



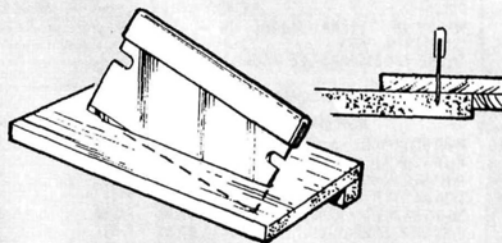
### DETACHABLE ANTENNAS

If you're tired of seeing your antennas damaged while sport flying or transporting your planes, why not make them detachable? Use short pieces of threaded rod and strategically placed blind nuts.



### SLICK SERVO-SAVER

It's easy to make this servo-saving slip joint in either the nose-gear pushrod or the one that goes to the tail wheel. Cut the wire rod; overlap the ends by about 1 inch; slip a piece of tightly fitting silicone tubing over them. In a crash, the wires will absorb the impact by sliding instead of damaging the servo gears. Realign them by holding the servo arm and twisting the nose leg back to the straight-ahead position while ensuring that the rudder has been "neutralized."



### SUPER STRIPPER

Make this "lazy man's balsa stripper" out of hard-balsa scraps and a razor blade, which is glued to the block with CA. The blade must be parallel to the guide strip. Cut thicker balsa by cutting both sides of the wood—one pass on each side. This handy tool is so inexpensive that you can make several—one for each size of strip you usually use.



# AIR SCOOP

by CHRIS CHIANELLI

*New products or people behind the scenes—my sources have been put on alert to get the scoop! In this column, you'll find news that will, at times, cause consternation, and telepathic insults will probably be launched in my general direction! But who cares?—it's you, the reader, who matters most! I spy for those who fly!*



There's a new event that's causing quite a stir—stunt-pylon racing. I think it's fascinating. Pilots do as many loops, rolls and—for extra points, touch-and-go's—as possible between the pylons. This 3.5-pound, 41-inch-span flying wing, which was exhibited by Mike Barbee at the Toledo Show, is powered by an O.S. 4500 BGX, and it's sure to be a strong contender—or even a

## NEW RECORD-BREAKER

show-stopper! If you have an all-out "power-machine" design for this new event, please send us a photo. We'd like to know *your* solution to the power-to-weight-ratio dilemma of stunt-pylon fliers.

## GIANT GYRO

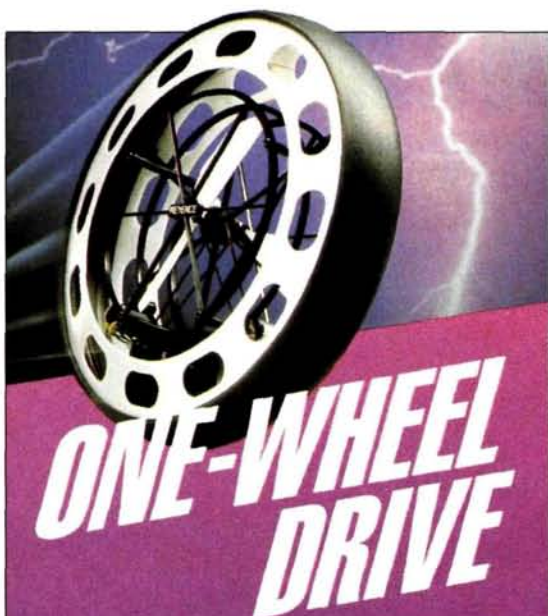
When we received the small, roughly 10-inch-diameter, electric Gyro Saucer II that was featured in last month's "Air Scoop," everyone here ran around saying, "I can't take it; I have to have one now!" They were very impressed with the little contraption and, of course, with my saucer supremacy! It wasn't immediately available, so they started to daydream



about scratch-building one. The builder of one such "home-brewed" saucer planned to install "four Astro 60s"! Well, it looks as though the Japanese haven't been able to find a vaccine for gyro fever, either! They've beaten us to the punch with this 6- to 7-foot gyro saucer that's powered by a centrally located glow engine (.60 to .80 size) that uses drive belts for the rotors. Successful flights have been logged; just look at the photos! If any of you out there are working a "secret" Gyro project, let us know; we promise not to tell...(honest!).



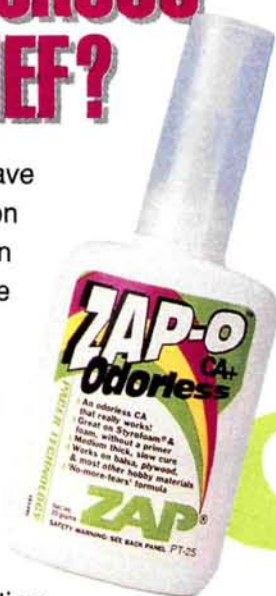




Here's the latest product from Keyence, the maker of that intriguing Gyro Sauter II. It's called the "Wonder Wheel," and it's controlled by three micro-motors and a gyro. One motor turns the wheel, while the other two operate the props (with the gyro, to control banking). I think this is one of the more useful R/C inventions—don't you? Sorry; it won't fly if you lay it on its side!

## MALODOROUS MISCHIEF?

How many times have you been working on that secret project in the cellar, only to be ratted-on by that cyano-miasmic cloud that works its way up into the kitchen. You hear, "My god! What's that stink down there!" For the first time, they see your titanium Cobra helicopter parked next to a 12-foot-span Memphis Bell. They investigate further: "I thought you said you only had a few hundred dollars tied up in this stuff? What's going on?" Your secret is out! It's over! You're finished! Don't let this happen to you. The Amazing Zap laboratories have done it!—odorless instant glue in medium viscosity. Protect your covert cellar operation; that putrid stinko pinko won't go upstairs and alert everyone if you use odorless Zap-O.



According to a Faxed message I recently received from the Pacific Trading Co. International, it will soon be importing Rossi engines and supplying dealers and distributors with engines and parts. The legal document that arrived with the Fax said that all the complications related to importing Rossi engines and parts have been resolved. So, if you're about to buy a new engine because you couldn't get a part for your Rossi, this news comes just in time. If you've already bought a different brand 'cause you couldn't wait...look at it this way: you have one more engine than the other guys.

# IS BACK

Rossi®





# FIFTY YEARS AGO

## SUPERCHARGED ATMOSPHERE

by CHRIS CHIANELLI

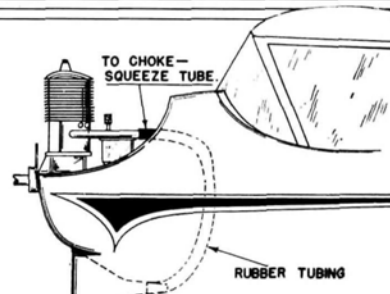
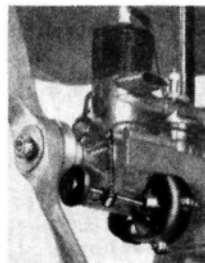


ON THE LAST page of the August '41 issue of *MAN*, there's an ad for Carl Goldberg's Interceptor model. A polyhedral, free-flight tissue model is shown braving enemy flak. This ad said a lot about the state of mind not only of aeromodelers then, but also of Americans in general. (I first met Mr. Goldberg several years ago when he was well into his 70s. I spoke with him again

almost a year later; he not only remembered my name, but he also spelled it and pronounced it perfectly—something I still can't do at times. He's greatly missed.)

The Curtiss-Wright Model 20 Transport is shown on the cover. "Never in all of America's aviation history has a plane been kicked around like our plane on the cover this month." This plane had two engines that developed 4000hp, and it had a wingspan of 108 feet, a length of 75 feet and a top speed of 243mph. "Here is the backbone of aviation all wrapped up in an outstanding airplane and no one has purchased it." Why?—because in 1939, when airlines needed passenger planes, the Model 20 wasn't ready, and when it was completed, the focus had turned to warplanes.

In September 1939, the world had witnessed the



Two early modeling attempts at "superchargers." The one on the right is really nothing more than ram-air. The one on the left, however, looks like an honest attempt at a powered-takeoff turbo impeller.

devastating effectiveness of the Luftwaffe's Blitzkrieg in Poland, and less than a year later in the late spring of 1940 at Dunkirk, the only thing that allowed 300,000 British soldiers to return home safely on an emergency military/civilian flotilla was air cover from England. It was this air cover that diverted the Luftwaffe's attention from an easy target: men climbing into boats on the open beaches.

The United States responded to the Luftwaffe's effectiveness as the modeling world watched. *MAN* Editor Charles Hampton Grant (inventor of the leading-edge slats) stated in his August '41 editorial, "America is in a state of emergency, and now we have a job to do. Ten years of slowed production has produced only a limited number of qualified men." It's true that American industrial wheels were rusty, but once they were up to speed, there was no stopping them. At the time, the most popular airplanes available to modelers were renditions of the latest, hottest planes that were being offered to the military. The Republic P-47 (later known

as the Thunderbolt) was being tested by the Army; the 400mph Corsair was touted as the Navy's favorite fighter; and the 420mph Lockheed P-38s were rolling off the assembly line. "Training schools," says Mr. Grant, "are overcrowded, endeavoring to acquaint workers with the fundamentals of creating airplanes. One school, however, has given systematic training in these principles for many years. It's the school of model-airplane designing, building and flying."

### SUPERCHARGERS

Superchargers seemed to be the items on the most threatening fighters of the day. The Republic P-47 looked like a simple craft, but there was a complicated, supercharged airplane with intricate duct work hiding inside its portly jug shape.



1941 original photo caption read, "The new 2000hp Republic pursuit plane, P-47, being tested by the army."

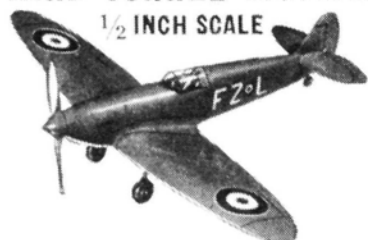
CLASS "A" or "B"  
from same kit



This is an advertisement for a free-flight model designed by the famous Carl Goldberg. The name of the model and the situation depicted reflects the tone of the time.

## WIND TUNNEL MODELS

1/2 INCH SCALE



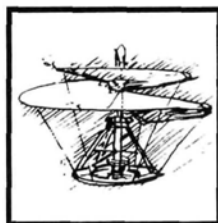
Here's an ad for what was claimed to be an authentic wind-tunnel model. This appealed to modelers because of the highly publicized use of models for full-scale R&D.

The new Corsair and the P-38 were also equipped with superchargers. Their reputation as highly effective warplanes lived on. The army wanted to add more armament to the P-39 Airacobra. Worse yet, its supercharger was eliminated, leaving the poor P-39 with a reputation as little more than a sluggish tank-buster.

Shown here are two supercharger systems for model airplanes. One appears to be an actual shaft-driven turbine supercharger, while the other is nothing more than a ram-air setup. Whether they worked or not isn't the point (although there are engines today like the supercharged O.S. 120 4-cycle now in production, which no doubt owes its success to early experimentation). What's interesting is that full-scale designs influenced model design, and models influenced full-scale design. Appropriately symbiotic, don't you think?

Wind-tunnel models were heavily used, and this proved the value of modeling in full-scale R&D. Of course, some felt that men were just playing with toys, and that they took themselves much too seriously by doing such things as placing tissue-covered models in air battle scenes. I wonder what these critics would say if they could see today's Navy RPVs (remotely piloted vehicles) doing real-time laser targeting missions for "smart" bombs and 16-inch guns, 20 miles away! ■

# The Second Great R/C



# Design Contest

—Your chance to become a famous modeler!

*The best five designs will be featured in Model Airplane News as construction articles, and all will be considered for publication.*

1st Place—\$1,200    4th Place—\$500

2nd Place—\$900    5th Place—\$250

3rd Place—\$750

### How to enter:

Submit several clear photographs of your model (include flight shots) by AUGUST 1, 1991. Only models that have never been published or manufactured are eligible, but there is no restriction on type of R/C plane.

### Who will choose the winners?

—YOU WILL! Later in 1991, your votes will decide the winners. We'll publish photographs of the models, and you'll send us a postcard with your choice.

### Announcing the winners:

Model Airplane News will feature an article giving details of the five winners, and each one will be the subject of a feature construction article.

### Be prepared!

Winners must be prepared to submit a complete construction article (6 to 8 typed, double-spaced pages; formatted on disc is preferred), good black-and-white photographs of the building sequence, full-size construction plans and color slides of the model, both on the ground and airborne. Before announcing the winners, the publisher must receive proof that plans, photographs and articles are available for the five chosen designs. Send your photos to "Design Contest," Model Airplane News, 251 Danbury Rd., Wilton, CT 06897.



# HOW TO:

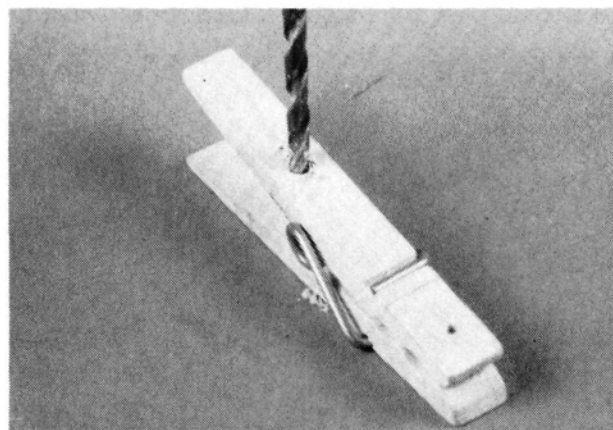
by RANDY RANDOLPH

## MAKE A GLOW-PLUG CLIP

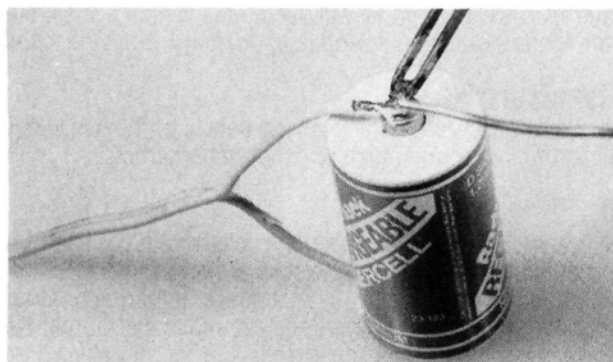
*You can solder this inexpensive glow-plug clip to a D-size starting battery. Although the photos show a rechargeable Ni-Cd, a dry-cell battery can be connected in the same way. When it has died, the battery can be un-soldered and discarded.*



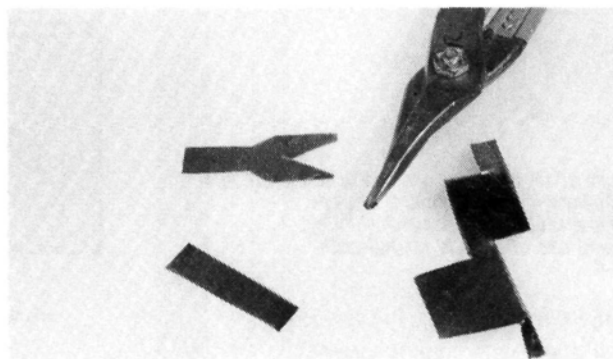
1. You'll need: a battery, a wooden clothespin, a straight-sided can, two small machine screws and about 3 feet of common lamp cord.



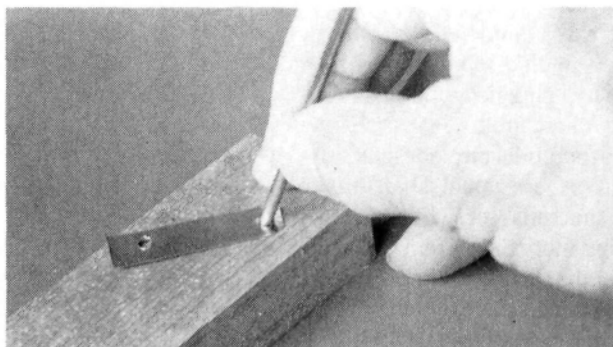
3. Drill a  $\frac{5}{32}$ -inch hole through both "legs" of the clothespin just behind the spring. Drill a  $\frac{1}{16}$ -inch hole about  $\frac{1}{4}$  inch from the end of the jaws, but stagger the holes slightly so that they aren't opposite each other. Make a small saw cut across the jaws, just in front of the spring anchors.



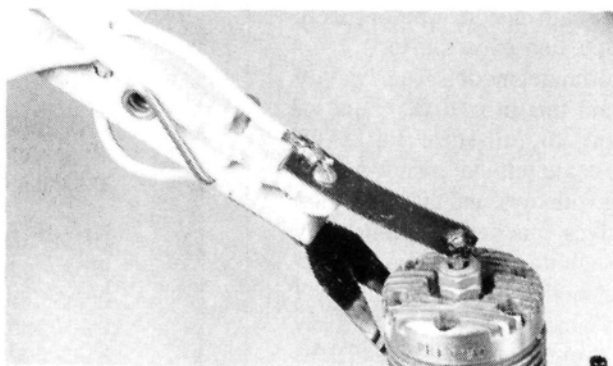
5. Strip the insulation off the two wires at both ends of the lamp cord. Solder the wires to the opposite ends of the battery. If you disconnect it as soon as your engine starts, a standard D-size dry cell will last quite a while as a starting battery.



2. Using tin snips or heavy-duty scissors, cut the can to make two connectors. The plug's connector measures  $\frac{1}{4} \times 1\frac{1}{4}$  inches (bottom left); the ground connector's shank measures  $\frac{1}{4} \times \frac{1}{2}$  inch, and it flares to the forked shape shown (top left).



4. Bend the shank end of both connectors, and drill a  $\frac{3}{32}$ -inch hole in each to match the  $\frac{1}{16}$ -inch holes in the clothespin jaws. Use a hammer and a piece of  $\frac{1}{8}$ -inch wire (used as a punch) to form a "dimple" in the end of the plug's connector so that it will fit the connector snugly. For a more secure fit, hold the wire at the angle shown, and make a semicircular cut at the front of the dimple.



6. The bent ends of the connectors fit into the slot sawn into the clothespin, and the connectors are fastened with small sheet-metal screws. The two wires from the battery are slipped through the  $\frac{5}{32}$ -inch holes (as shown) and soldered to the connectors. This clip will fit most engines from the .049s to the .60s.



# PILOT PROJECTS

## A LOOK AT WHAT OUR READERS ARE DOING!

### SEND IN YOUR SNAPSHOTS!

*MAN is your magazine and, as always, we encourage reader participation. In "Pilot Projects," we feature pictures from you—our readers. Both color slides and color prints are acceptable.*

*All photos used in this section will be eligible for a grand prize of \$500, to be awarded at the end of 1991. The winner will be chosen from all entries published, so get a photo or two, plus a brief description, and send them in!*

*Send those pictures to:  
Pilot Projects, Model Airplane News,  
251 Danbury Rd., Wilton, CT 06897.*

### WHERE DID HE GET THAT WONDERFUL TOY?

He built it himself! Steve Bothe of Cedarburg, WI, scaled this model up from a 2-inch Bat Wing toy. Made of 1-inch-thick foam, it's 45 inches wide and 38 inches long. Powered by an O.S. .40, this 4-pound Bat Wing has three servos to handle elevator, ailerons/steering and throttle. It flies according to the same principles as the flying stop sign and other flying disks, and Steve writes that the Bat Wing is a "great attention getter at fun-flys!" We're not surprised. The Bat Wing certainly got our attention—no joker!



### WHITE MOUSE WITH TALONS?

It took David Chambers of Lamirada, CA, 12 weeks to build this sleek Northrop T-38 Talon (pilots nicknamed the full scale plane the "White Mouse" because of its gentle handling traits) from a Custom R/C Aircraft kit. It's painted with K&B paint, equipped with Rhom Air retracts and powered by a Rossi .90. David custom-made the tuned pipe. He wrote, "The model will have flown by the time you read this." We all hope the White Mouse has landed of all fours...well, uh—threes?

### ULTIMATE PATRIOT

Irwin Barber of Lake Placid, FL, completed this star-spangled "aerobat" this spring. It's powered by an O.S. 91 Surpass and covered with Coverite. Its finish is auto acrylic lacquer with a clear polyurethane topcoat to make it fuelproof. Irwin told us that he used "lots of masking tape" to finish the pretty biplane and that it "flies great."







### QUARTER SHOOTER

Dave Lauck of Algona, IA, spent 500 hours scratch-building this Boeing P26 Peashooter from *MAN* plans. The full-scale version, introduced in 1934, was America's first all-metal monoplane fighter. The 23-pound model is powered by a Super Tigre 3000 and is covered with Super MonoKote. Dave also used a T&D Specialties cowl and 3/16-inch, flat-spring, steel struts from Proctor Enterprises. The beautiful Peashooter makes Dave a "big-gun" builder in our book!



### SE5a IN DUTCH

This Top Flite SE5a was built by Ton von Munsteren of Leiden, the Netherlands. It's powered by an HP 61 4-stroke and guided by a Futaba 1024. Covered with Polytex and painted in a color that he mixed himself, Ton's 7.7-pound WW I fighter won 2nd place for Scale in the '90 Dutch Scale Nationals. Ton wrote, "Keep *MAN* as good as it is." We reply, "Keep your modeling as good as it is, Ton!"

.....



### CLASSIC AIRMASTER

Builder Tom Krapp of Grand Rapids, MI, is the proud owner of this beautiful round-engined Cessna C-37 Airmaster. Tom built this 111-inch wide, 30-pound plane from his own plans and has logged 28 flights with the aerial photographic equipment that's on board. The Cessna is powered by a Q-50, but perhaps a 4-stroke twin would come closer to the Jacobs radial that was originally used in the full-size Airmaster.

.....

### FRATERNAL FALCONS

Thom Wilkinson and Russ Sechler of Buellton, CA, have built these nearly identical Fighting Falcons from Byron kits. Both F16s are equipped with Rossi .91s, Spring-Air retracts and Futaba 6-channel radios. Notice that the first-born Falcon doesn't have sidewinders.





# An unusual French design

by LADDIE MIKULASKO

**U**NUSUAL PLANES have always fascinated me. For this reason, I was quite excited to receive three-views of the most intriguing-looking French planes from well-known French modeler Mr. Fillon. The Hemiptere is one of the more orthodox designs in this batch, and it was designed by Mr. Mouboussine. I had no description of the prototype, or details about its history and flying characteristics, but I decided to build it as a scale model.

Using the three-view, I drew working drawings for a plane that would use a .90 4-stroke engine (a .60 2-stroke could also be used). Because the model's construction is relatively simple, I was able to build it in a short time.



Author prepares to fly the Hemiptere.

PHOTOS BY MIKE MIKULASKO



SPORT-SCALE

# Hemiptere

## S P E C I F I C A T I O N S

**Type:** Sport scale  
**Wingspan:** 64½ inches  
**Wing Chord:** 13 inches (average)  
**Wing Area:** 838.5 square inches  
**Length:** 48¾ inches  
**Engine req'd:** .60 2-stroke or  
 .90 4-stroke

**No. of Channels Req'd:** 4 (elevator;  
 rudder; ailerons; throttle)  
**Weight:** 136 ounces (8½ pounds),  
 ready to fly  
**Wing Loading:** 24 ounces/square  
 foot



## HELP WITH THE HEMIPTERE

For those of you who find this model appealing, I'll describe the building sequence. First, study the drawing carefully, and decide on the type of engine you want to use. Modify the drawing to accept your engine. (To hide the muffler inside the cowl, you might have to tilt the engine to one side.)

● **The fuselage.** This is where you start. Cut out the formers, the balsa fuselage sides and the plywood doublers. With epoxy, glue the plywood side pieces and top formers F1, F2, F3 and F4 to the engine blocks. When the glue has cured, glue this assembly to the firewall. To increase strength, use triangular braces, and be sure to keep the engine mounts square with the firewall. Glue the triangular stock to both the engine mount and the plywood braces.

On the inside of the fuselage sides, mark the positions of all the formers. Glue the top and bottom longerons to the sides, and glue on the plywood doublers. Remember to make a right-hand and a left-hand side. Build the fuselage upside-down on the workbench. Glue in the formers (all except the firewall). Make sure that everything is square with the plans and the building board. Turn the fuselage right side up, and glue the firewall and all the top formers into place. Glue the 1/4-inch square balsa into the notch on top of the formers, and glue on the top 1/8-inch balsa sheeting from formers F5 to F12. Plank the top front with 3/16-inch-thick balsa strips, and when the glue has dried, sand the planking down to a thickness of 1/8 inch. Glue the balsa sheet to the bottom of the fuselage; glue on the tail-cone pieces;

and then sand the entire fuselage to shape.

● **The cowl** is built directly onto the fuselage so that it fits accurately. Hollow-out the nose block to provide enough head room for the engine and to ensure adequate cooling. At the bottom of the cowl, cut an opening through which the hot air can escape. Mount the exhaust, and cut a hole through which the pipe will exit. When you've finished making the cowl, glue in the hardwood blocks that will act as anchors for the wing hold-downs and the stabilizer, and glue in the hardwood blocks that will support the tail-wheel assembly.

● **The wing** has no leading-edge sheeting so, to give it torsional strength, all the ribs are cut out of 1/8-inch-thick balsa sheet. To build the front spar, glue the 1/4-inch-plywood dihedral brace between the 1/4-inch square top and bottom spruce spars at the wing root, and glue 1/4-inch balsa fill to the wing tip as shown on the plans. Make the rear spar in the same way.

Slide all the ribs for one wing half onto the spars, and line them up with

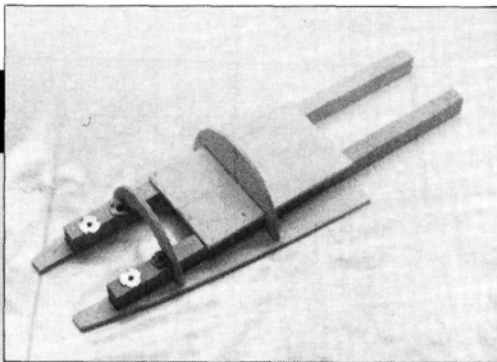
**"WHEN IT WAS TIME TO TEST-FLY THE MODEL, I WAS WORRIED. WITH THE HUGE LIFTING STABILIZER IN THE REAR, I HAD NO IDEA WHAT WOULD HAPPEN ON TAKEOFF."**

their positions shown on the plan. Glue them to the spars, and glue the trailing edge and leading edge to the ribs.

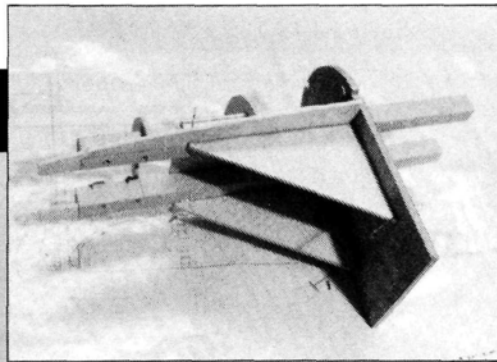
Make the wing tips separately by gluing 1/16-inch balsa strips together around a foam template that's as large as the



*The engine-mount assembly for the O.S. .90 4-stroke. Notice the installed blind nuts.*



*The firewall installed. The triangular gussets give it more support.*



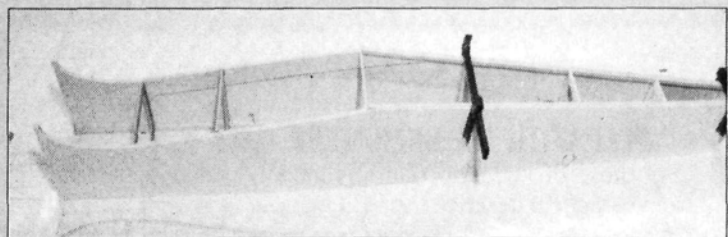
# HEMIPTERE

inside of the tip. When the glue has dried, glue the tip bow to the wing. Cut out the aileron section, and glue on its leading edge. Glue  $\frac{1}{8}$ -inch balsa strip into the cut-out section to close the opening. Build the other half of the wing in the same way.

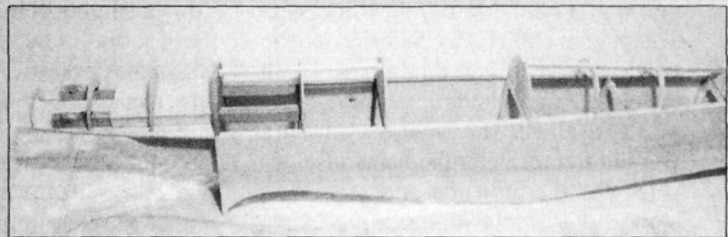
Glue the W1 ribs into the wing's center section, and add the two hardwood blocks that will support the wing bolts. Glue the trailing edge to ribs W1, W2 and W3, and install the aileron torque rods. Notice that the hinge line is close to the top of the aileron. To prevent binding, make sure that the torque rod is centered on the hinge line. Glue the top and bottom sheeting over the W1 ribs, and sand the wing to your satisfaction.

● **Landing gear.** Make the landing-gear legs by bending  $\frac{5}{32}$ -inch piano wire to the shape shown on the plan. To simulate a forked leg, cut steel or brass sheet to the shape shown on the plans and solder it to the piano wire. Attach the landing gear to the main spar with strong thread and epoxy. To simulate a gear strut, glue a split dowel over the gear leg, and then you've finished the main wing.

● **The stabilizer.** Build this in a similar way, but take care taken when you install the rudder controls.



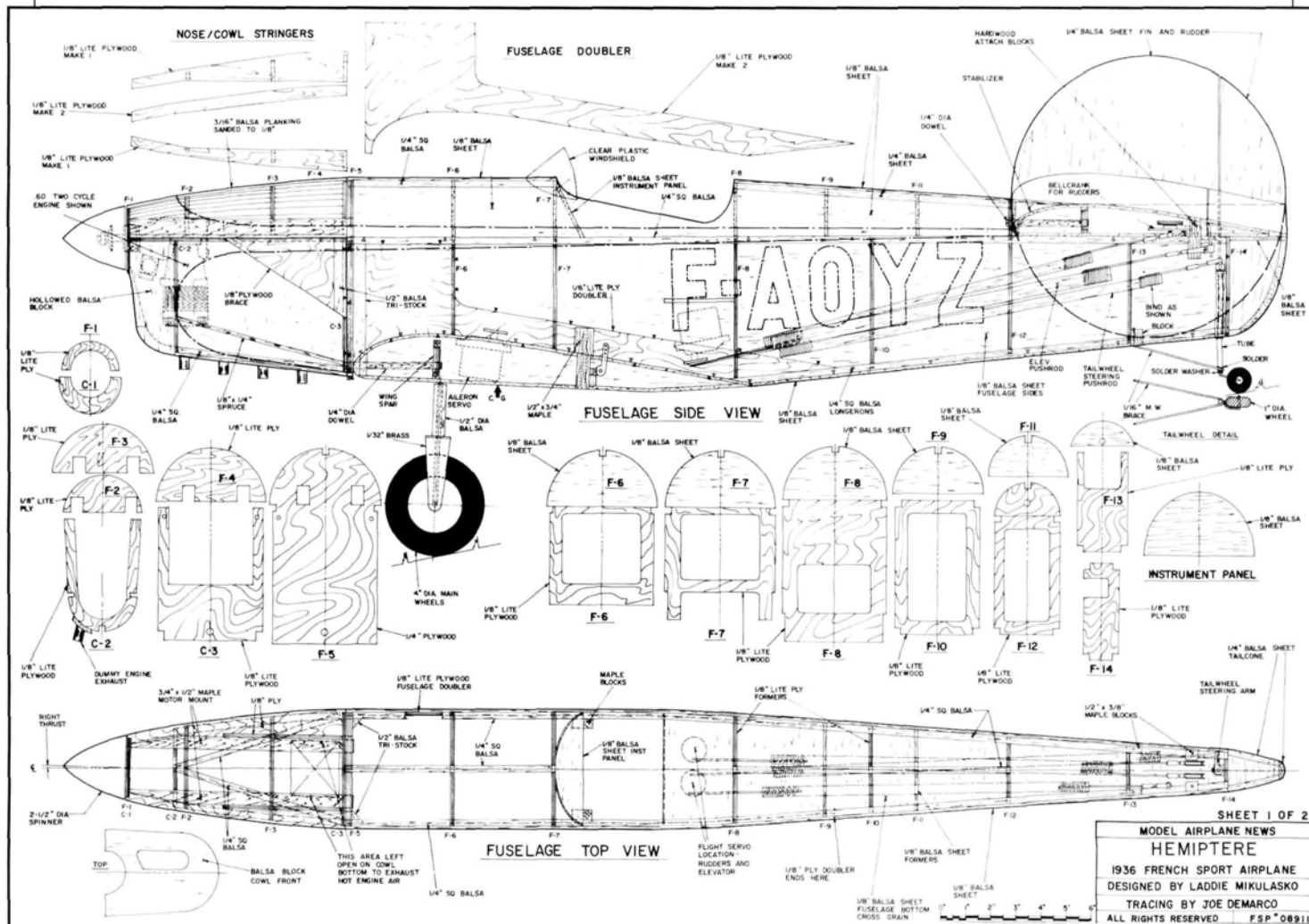
Build the fuselage upside-down on your workbench.



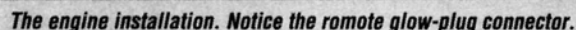
The firewall and the top halves of the formers are added.

Notice the position of the Du-Bro\* ball links on the servo wheel; they transfer movement from the servo to the rudders. Temporarily attach the tip plates to the stabilizer, and connect the pushrod to the rudders. Check the rudder deflection, which should be approximately 1 inch outward and  $\frac{1}{4}$  inch inward.

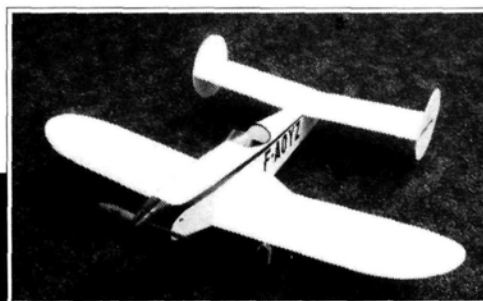
Before you cover the stabilizer, install the servos and the pushrods in the fuselage. As you'll see on the drawing, one pushrod from the rudder servo is connected to the tail wheel, and the other one is







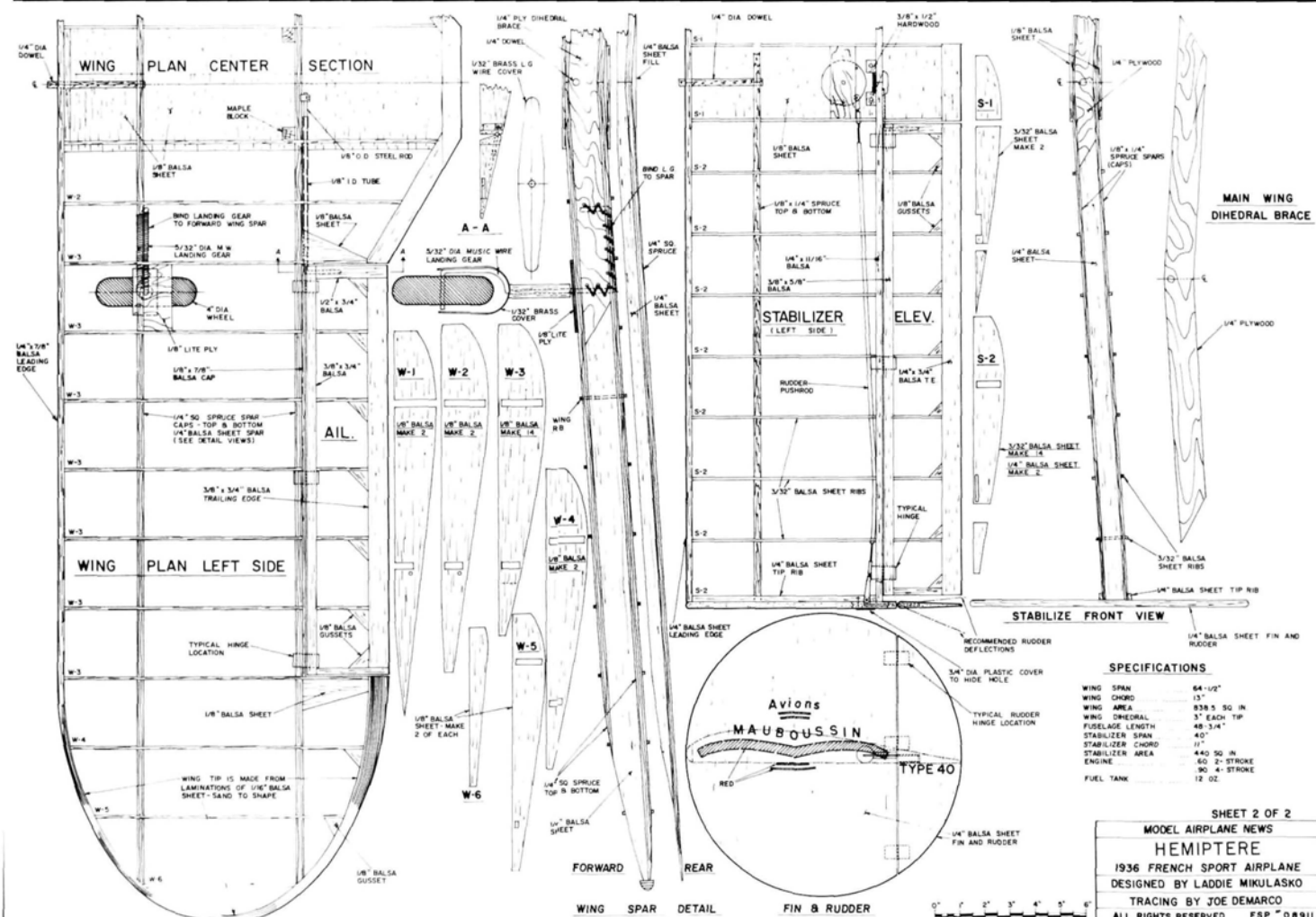
Finally, check the plane's balance point, and make sure that it's at the CG location shown on the plan.



**FSP 08911 SPORT-SCALE NEMIPTERE \$18**

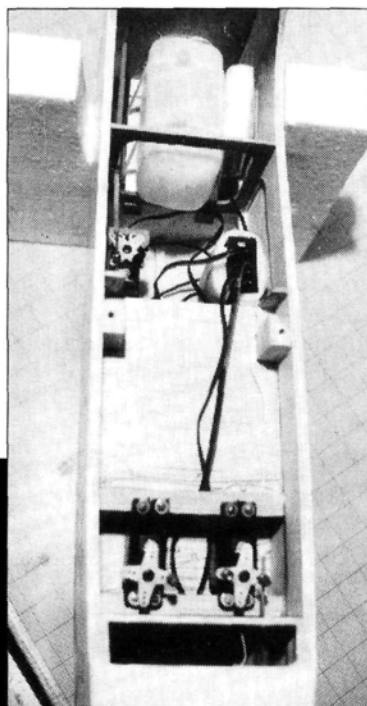
**Order the full-size plans...page 132**

**The Sport Scale Hemiptere is a "nice-flying," unusual-looking model of a French design. Designed by Laddie Mikulasko, this sorta tandem wing design uses a .60 2-stroke or a .90 4-stroke engine. The model uses conventional balsa-and-plywood construction, and it has tail-dragger landing gear and two very large disk-shaped rudders. Two full-size sheets. WS: 64<sup>1</sup>/<sub>2"</sub>; L: 48<sup>3</sup>/<sub>4"</sub>; LD: 3.**

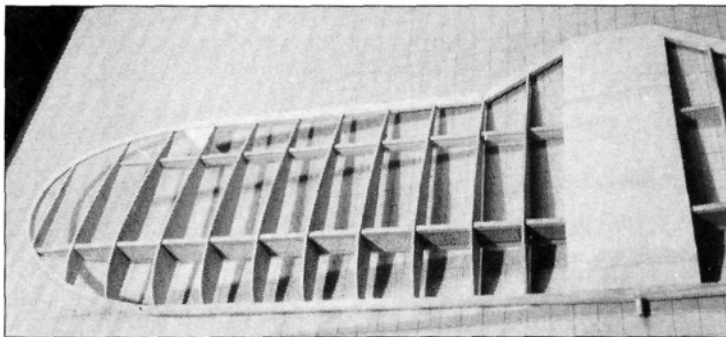




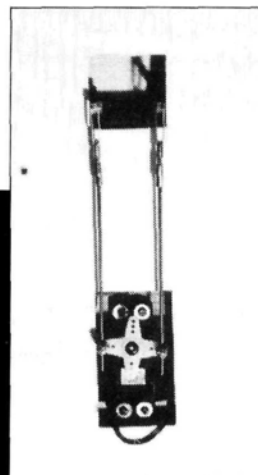
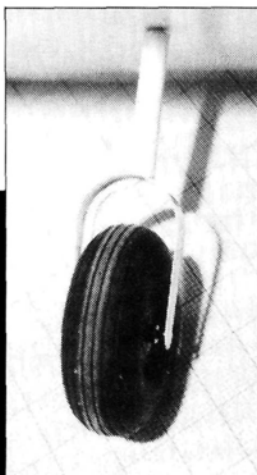
# HEMIPTERE



*There's plenty of room for the radio.*



*One wing half has been finished; the aileron still has to be cut out.*



*Far left: The landing leg shows the dummy "fork" that was soldered onto it after the wheel had been put on.*

*Left: The aileron hook-up.*

## FIRST FLIGHT

When it was time to test-fly the model, I was worried. With the huge lifting stabilizer in the rear, I had no idea what would happen on takeoff. When I had checked all the controls and the engine operation, I taxied out onto the runway. I applied the power, and the Hemiptere started to swing to the left, so I aborted takeoff.

On my next attempt, I held full-right rudder, and the model started to swing to the left, but the rudder soon corrected this and the model ran down the runway with its tail already up. Before I had a

**"...IT RESPONDED WELL TO ALL MY CONTROL COMMANDS...IT COULD LOOP AND ROLL, BUT IT WOULDN'T DO A SPIN OR FLY INVERTED."**

chance to decide what to do next, the Hemiptere was lifting off and climbing at a shallow angle. I let it gain height with minimum control input, then I started to explore its capabilities.

I was elated because it responded well to all my control commands. During its first flight, I found that it could loop and roll, but it wouldn't do a spin or fly inverted. I was interested to see what would happen at stall speed: I cut back the power and raised the nose, but all that happened was that the nose dropped again and the Hemiptere immedi-

ately picked up speed. I tried to stall it several times—always with the same result. The model was stable at any speed and position, and I'm convinced that the full-size version would behave in the same way.

## PROBLEM & SOLUTIONS

My only complaint was that the Hemiptere tended to swing to the left during takeoff. In an attempt to eliminate this problem, I did two things:

- I increased the rudder deflection. The rudders work differentially: when turning left, only the left rudder is deflected outward; when turning right, only the right rudder is deflected outward.
- I offset the engine slightly to the right.

The model behaves much better now. It might swing to the left if I apply too much power too quickly during takeoff. Landings have always been completely straightforward—touching down at very low speed with its nose high. Apply power gradually, hold up-elevator, and the tail wheel will stay on the runway until the rudders take over directional control. As the speed builds up, ease off up-elevator, the tail will come up, and the model will lift off.

That's it! I hope that you'll enjoy flying the Hemiptere. Good Luck!

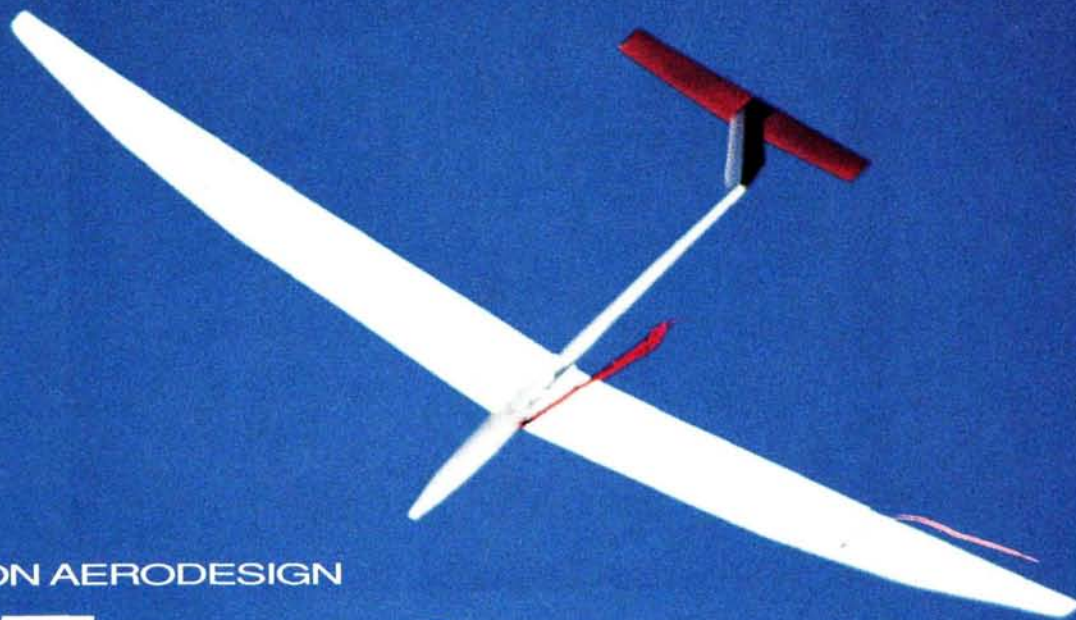
*\*Here's the address of the company mentioned in this article:  
Du-Bro Products, 480 Bonner Rd., Wauconda, IL 60084. ■*





*Left: I landed the Magic in the crow position (ailerons up and flaps down). It was easy to position it for pinpoint landings.*

*Below center: The Magic launches into the sky just before the winch line is released.*



WESTON AERODESIGN

# Magic

by MICHAEL LACHOWSKI



*The Magic springs into the air above me; David Baron observes.*

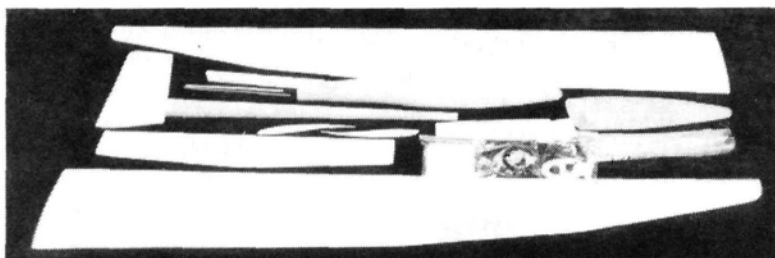
**M**Y FIRST encounter with Frank Weston's\* designs was at a CASA (Capitol Area Soaring Association) contest. You may have read about Frank's other designs, e.g., the Terminator. They receive a lot of attention, especially their light, vacuum-bagged wings. The "Magic" is Frank's Unlimited Class ship, and he has done very well flying it on the ESL (Eastern Soaring League) circuit.

PHOTOS BY MICHAEL LACHOWSKI & YAMIL SUED

S I M P L Y   S O P H I S T I C A T E D



# Magic



The kit's vacuum-bagged components suggest the simplicity of the Magic's design.

## THE KIT

I picked up my Magic at a Weston Aerodesign building seminar. There, I watched a wing panel being pulled out of the bagging setup, and all the steps required to scratch-build the kit.

I bought the bagged-wing version of the Magic, which has few parts. Both wing panels, the rudder and the stabilizer come vacuum-bagged, and only light sanding and control installation are required to finish them. The vacuum-bagging leaves a very smooth surface finish; the only rough spots are on the leading edge. The white pigment added to the epoxy eliminates the need for finishing (if you like the white color).

The fuselage consists of a front section and a long, cylindrical boom that requires some assembly. This differs from conventional fuselage construction, which usually consists of two sides joined lengthwise. All the necessary hardware, including Kevlar pull-pull cables and super-strong wing rods, comes with the kit. There are 17 sheets of drawings, six pages of instructions and a 14-page manual for scratch-builders.

## CONSTRUCTION

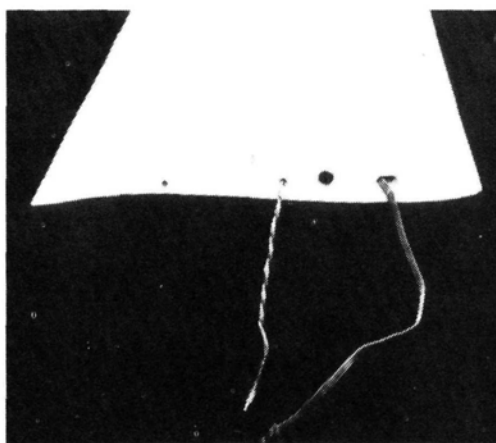
The manual lists the time each step should take (that doesn't include time out for admiring your work). Without rushing through the steps, I completed my Magic in 25 hours over nine days. (I also took pictures for this article and did some admiring.)

You could probably do the job in 15 hours. This is a full-size, high-performance sailplane!

The Magic's fuselage is

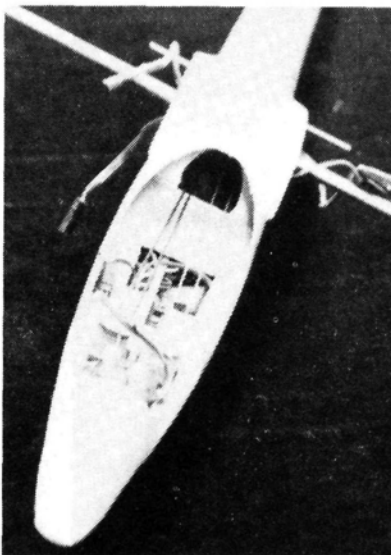
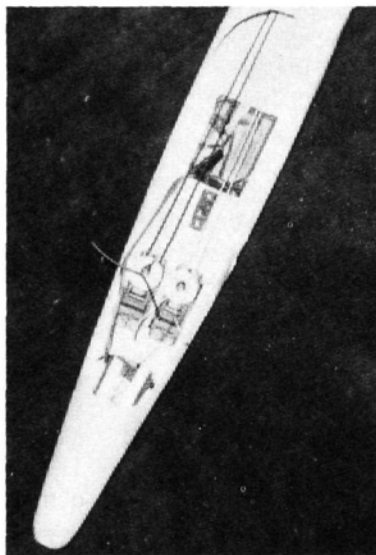
different from most fiberglass fuselages. The manufacturing process has been simplified, and less epoxy is used, so the fuselage is stronger and lighter. The front lay-up (i.e., from the nose to a couple

of inches aft of the wing) was formed over a male mold at



Note how thin the FX60-100 airfoil is near the trailing edge in this root-section view. Vacuum-bag construction is ideal for this wing.

the factory. It was then removed by cutting along the fuselage's bottom. The boom is laid up over a form made of a rolled tube of Mylar. Just



■ Left: Radio installation is easy; there's plenty of room, and the removable nose cone provides easy access. (The nose slides over the fuselage's front end.) ■ Right: This front view shows the wing-root fairings that I built up.

## SPECIFICATIONS

**Type:** Unlimited sailplane

**Wingspan:** 138 inches

**Wing Area:** 1,077 square inches

**Weight:** 68 ounces

**Wing Loading:** 9.1 ounces per square foot

**Airfoil:** FX60-100 (version tested); recommended: WA001.

**No. of Channels Req'd:** 4 (flaps, ailerons, elevator, rudder).

**Radio Used:** Airtronics\*

Vision V8SP, Airtronics 6-channel FM receiver;

Airtronics 94831 servos for rudder, elevator, each flap; Futaba\* S133 servos for each aileron.

**Sug. Retail Price:** \$295

(complete kit); \$495 with vacuum-bagged wings and tail (kit reviewed); \$895 (complete, ready to fly, with radio installed).

**Features:** This highly competitive thermal-duration sailplane is built of the latest high-tech materials: Kevlar and S-glass fuselage with removable nose cone, vacuum-bagged S-glass over extruded polystyrene foam wings with spruce spars, bagged wings and tail surface of white pigmented epoxy that requires no finishing.

**Comments:** The vacuum-bagged kit is suitable for intermediate builders and intermediate to advanced fliers. The Magic can be assembled quickly. It has great thermalling abilities, and its performance is as competitive as anything on the market.

# Magic

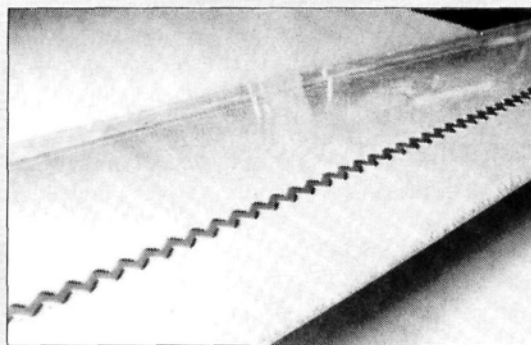
insert the tail of the fuselage boom through the canopy. The front of the boom protrudes into the fuselage's front piece. This overlap is glued with CA, and the joint is faired with an epoxy and microballoon mixture.

[Editor's Note: in the current version, Spectra has replaced Kevlar in the fuselage and fiberglass in the wing.]

The only wooden fuselage parts are the tow-hook mount, two formers (they

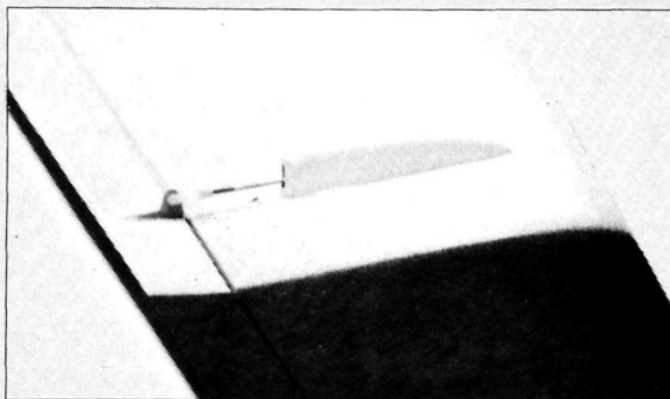
needed some fitting) and the servo tray. Use thick UFO\* to glue the wood to the Kevlar. Add the wing fairings. I built my own instead of using the molded ones that came with the kit. Although this was more time-consuming, the fairings provide me with a solid mount for the wing rod, and exact alignment of the wings with the fairings. The fairings have outer plywood ribs that are aligned with the wing-root ribs, and wooden pieces carved to shape fill the gaps between the fuselage and the plywood ribs. A filler of epoxy and microballoons smooths the fairing. For extra strength, I also added a layer of glass-cloth.

## Improving Sailplane Performance

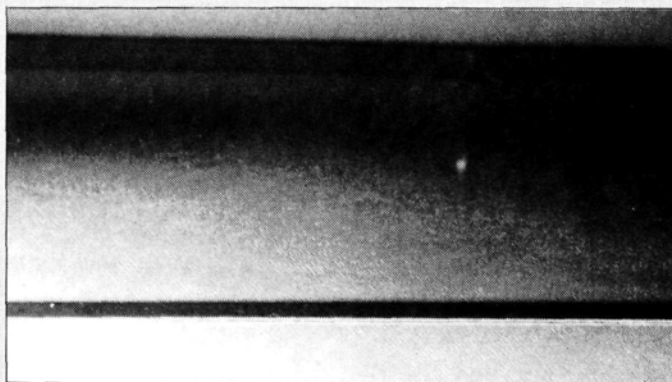


*Hobby Lobby's Zackenband Z-band turbulator strip is shown installed on the top of the wing near the tip. The strips are quite thick.*

**H**obby Lobby sells a variety of sailplane accessories. On the Magic, the molded pushrod exits (HLAN 9321 HL/Aeronaut, Aileron Pushrod Fairings) clean up the airflow over the aileron and flap pushrods. These plastic parts can be taped to the wing to cover the servo arm and pushrod. You can tell these parts are doing their job when you make a high-speed pass and notice how much quieter the ship is.



*Hobby Lobby's aileron pushrod fairings clean up the control linkages on the Magic.*



*This simple trip strip is made of three layers of automotive striping tape.*

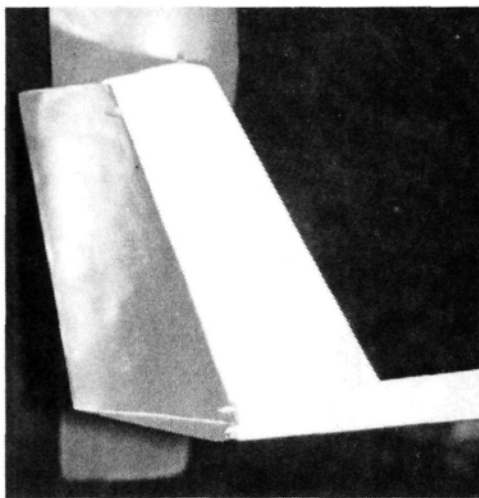
The Magic uses turbulators to improve the airflow over the wing. For the top of the wing, the plans recommend the installation of a trip strip made of three layers of striping tape. An even better solution to turbulence is the use of a Z-shaped turbulator. Hobby Lobby sells a Z-band turbulator strip made of thin plastic (HLMT 3521 Zackenband, Red). It looks better than the trip strip, and it's available in a variety of colors. Does it really work? Flight testing isn't a very precise way of measuring its effectiveness, but the experimentation sure makes for good conversation!

## EMPENNAGE

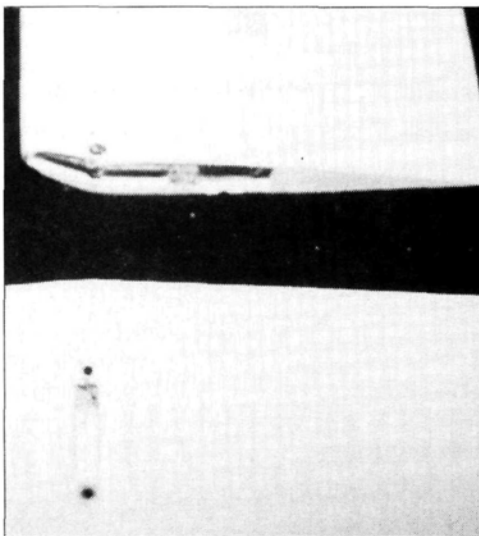
The fin and rudder must be cut apart. I built the rudder's hinge line by sanding a rounded groove in the fin's rear edge and adding a piece of rounded foam to the rudder's front leading edge. For the hinge mounts, use short dowels on the top and bottom of the rudder. For the rest of the hinges, I used short pieces of epoxy/glass plate mounted on the top of the fin and on the bottom of the fuselage. At the top, the rudder pivots on a short wire pin that's mounted in the top dowel; at the bottom, it's attached by a small screw that comes through the bottom plate and into the dowel. When the screw is removed, the rudder can be easily removed. The Kevlar pull-pull cable is wrapped twice around the bottom dowel and tacked into place to make a simple mount.

The edges of the stabilizer required some minor sanding to clean up any flashing left after vacuum-bagging. The stab mount in the center of the stab and the stab mount in the fin are installed at the factory before the bagging process. Only the tube





Notice the placement of the stabilizer. The Kevlar pull-cable is just visible at the base of the rudder.



Here are the stab mount fixtures in the stabilizer and the fin.

through which the stabilizer cables are routed must be installed in the fin. I installed two separate tubes for the cables so that they wouldn't rub together.

The only questionable part of the Magic's design is the stab mount. The stab pivot on my Magic is made of  $\frac{3}{16}$  plywood, and there's some play in the mount that makes the stab tilt and flop around. Because the linkage cables are bent around a pin that's inserted into the fuselage boom, they experience some friction, and the centering isn't as precise as I'd like it to be. This doesn't seem to bother the Magic too much when it's flying. The linkage cables are also wrapped around the top of the stab, so there's no easy

way to remove the stab for transportation. The newer Magics have a removable stab and a redesigned mount with reduced play.

## WING

When you look at the FX60-100 airfoil, you'll know why you haven't seen it before in kits. It would be nearly impossible to build one out of wood! I ordered the wings already bagged, so construction went quickly. After some minor sanding on the edges, I cut out the control

surfaces with a new razor blade. Be careful when you sand; it's easy to sand through the fiberglass on the leading edge, and there's no wood behind it, (only fiberglass). If you fly off a very rough field, this construction may cause some problems near the wing tips. The plans specify UFO\* glue for fin-

ishing the edges of the control surfaces. The leading edge of the aileron is less than  $\frac{1}{8}$  inch thick. To reduce aileron flexing, glass the aileron's leading edge. There were a few imperfections near the trailing edge: wrinkles in the fiberglass appear during the bagging

(Continued on page 83)

## TRANSMITTER AND CONTROL TEMPLATE

### Main Menu (1)

L Setup (ENT) (1)

Access Level 3

S Setup (ENT) (1)

Alternate (OFF)

Alter Mode? Yes ..... Standard Mode II configuration

Mode B? No

Zero Sticks (ENT)

EEP (ENT): 0.21761

### Basic Config (1)

2A 2F E R (ENT) ..... Two aileron servos and two flap servos

Gear Mode? Yes

V Tail? No

Slide Rev? No ..... Lever on left side used for camber adjustment

Slide Spl? No

Freeze Flap? No

L Dsab Camb? No ..... No special mixing triggered by landing or flight mode

La Hi A2R M? No

Lc Hi A2R M? No

Swp Ca->A2R? No

PPM 6 ..... For Airtronics 6-channel receiver

Set L Thrsh (ENT)

Reverse: NNNNNNN ..... Adjust reversing depending on control installation

1.32msS: YNNNNNN ..... Futaba S-33 servos used for ailerons

## SURFACE ADJUSTMENTS, MAIN AND ALTERNATE

### Surface Adj (1)

Center LAil: 0%

Center LFlap: 0%

Center RFlap: 0%

Center RAil: 0%

Center Elev: 0%

Center Rudd: 0%

Differ: 66%

Land Differ: -66% ..... Differential changes for crow aileron position

L Ail LTV: 75% ..... Adjust travel limits to desired control response

L Ail RTV: 60% ..... Be sure to check for upper travel limit with crow

R Ail LTV: 60%

R Ail RTV: 75%

LFlap TV: 48%

RFlap TV: 48%

Elev UTV: 66%

Elev DTV: 66%

Rudder LTV: 100% ..... Cable setup for rudder requires maximum throw

Rudder RTV: 100%

Side/Cmb TV: 50% ..... Adjust for camber lever sensitivity and movement

# Recommended Magic Vision 8SP Transmitter Settings

## MIXER ADJUSTMENTS, MAIN AND ALTERNATE

### Mixer Gains (1)

1 Ail->Rudd: 50%

2 Ail ->Rudd: 25% ..... Normal flying with low-rudder mixing rate

Rfx A->Rudd: 0%

LAil->LFlap: 0% ..... No aileron mixing in flaps

RAil->RFlap: 0%

Crow->LAil: 40% ..... Crow is mixed in for alternate setup

Crow->RAil: 40% ..... Raises both ailerons for landing control

Camb->LAil: 20% ..... Full span camber adjustment mixing

Camb->LFlap: 20%

Camb->RFlap: 20%

Camb->RAil: 0%

DElev->Camb: 0%

UElev->Camb: 0%

Camb->Elev: 0%

Flap->Elev: -18% ..... Compensation for flap movement on landing

Gear->Elev: 0%

## PRESETS AND DUAL RATES, MAIN AND ALTERNATE

### Preset/DR (1)

EPST #1: 0%

EPST #2: 0%

EPST Lch: 0%

EPST Rfx: 0%

Camber Rfx: 10%

Camber Lch: -70% ..... Drop entire trailing edge on launch

Flap Lch: -8% ..... Drop flaps even more

Aileron D/R: 100%

Elev D/R: 100%

## Preparation for giant-scale mini-Reno heats up

by ROB WOOD

R / C U N L I M I T E D



# RENO-STYLE

R A C E S

*WORLDWIDE EXCITEMENT is mounting as modelers anticipate the First Annual R/C Unlimited Air Race and Air Show Competition, which will be held*

*on October 3 through 6 at the municipal airport in Madera, CA. At the time of this writing, 61 entries from across the U.S., Mexico and Canada have been*

Fresh from their 1990 Schneider Cup Victory at Lake Havasu, AZ, the Pec's Hobbies team is hard at work on its 1/5-scale, Reno-style, P-38 entry for the Unlimited Giant-Scale races that will be held this fall at Madera, CA. I interviewed H.L. Scates (builder/sponsor) and Frank Schoening, (pilot) at Pec's in Mountainview, CA.

**RW:** Who made the decision to enter the competition at Madera?

**Scates:** Frank and I both did, at Havasu. I wouldn't say that we were sitting in a bar, but we were damned close. We were racing in the Schneider Cup, and we just thought this would be a great idea. Of course, Cliff Adams (co-founder of the R/C Unlimited Races) is at Havasu every year, and we know Cliff really well, so we decided to get into the thing.

**RW:** How did you decide on a P-38 for your entry?

**Scates:** Without giving it too much thought, we decided; well, after looking at Cliff's 9-cylinder in his 1/3-scale Rare Bear, we thought the way to do it is to get something you could hang a lot of horsepower on; and that was the basis of this airplane.

**RW:** Is the P-38 modeled after a particular airplane that flew at Reno?

**Scates:** No, it's not.

**RW:** Why don't you tell me a little about the kit and why you chose it.

**Scates:** It's a CBA Models (Bob Antonelli) kit out of Warren, OH. I built one of Bob's F7F Tigercats, and I liked it—liked the glass work; so, when it was time to get a P-38, I gave Bob a call.

**RW:** What engines are you using?

**Scates:** Sachs-Dolmar 5.8ci.

**RW:** You said you chose this model so that you could hang a lot of horsepower on it. How fast do you expect it to fly?

**Scates:** Well, we're sending the engines out to have them souped-up. When the smoke clears, we expect to have about 25hp in them. We're just fledglings in this. I've never flown a P-38 before, and neither has Frank. It's a clean airplane, and it should go pretty fast. When we test-fly it, we'll find out.

**RW:** Have you run into particular problems when building it?

**Scates:** Yes—a serious one:

55 pounds. We're sanding pieces down. In running our analysis of what the overall weight will be, it will be really hard to come in under 55 pounds

**RW:** Any other problems?

**Scates:** Well, mufflers will be a problem. We have a noise limit of 102dB at 20 feet. With both big engines running, it's going to be some work. We haven't solved that one yet, but we're working on it.

**RW:** What landing gear are you using?

**Scates:** Robart: it's the lightest.

**RW:** And radio?

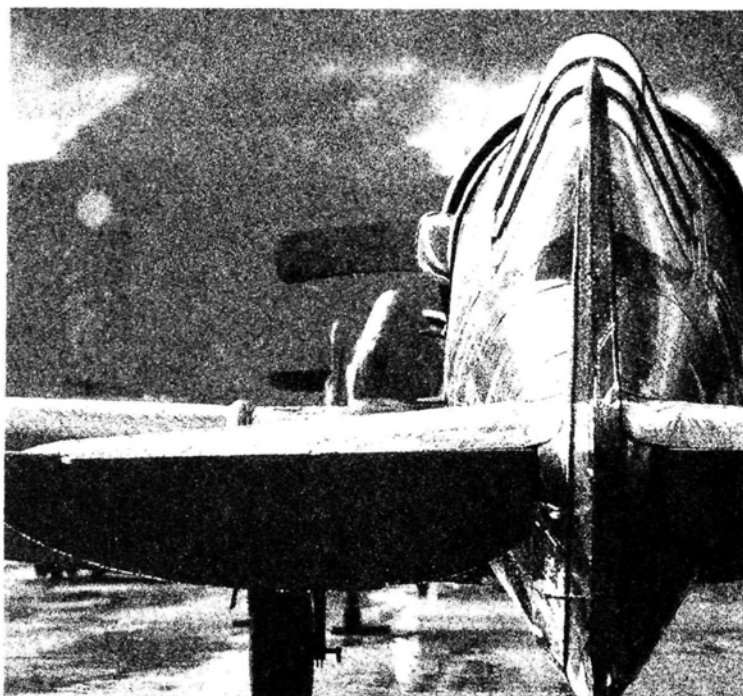
**Scates:** An Airtronics Spectra 7. It's the only radio we use.



received and, according to Tom Easterday (a co-founder of the event), another 15 are expected.

Although other groups have sponsored Reno-style R/C air races, the Madera event will be the first giant-scale variant. The rules are simple: the model must represent a full-scale, piston-engine aircraft (civilian or military) that has qualified for the Reno Air Race in the last 26 years; it must have a 100-inch wingspan prior to clipping; it must have a true-to-scale outline (within 5 percent); and it mustn't weigh more than 55 pounds.

We've heard some grumbling from scale purists: the rules don't require the exact modeling of specific



## HOG P-38

We're mounting 735 servos in the rear of the booms; 732s for ailerons and throttles.

**RW:** What about the fuel system?

**Scates:** We're using a 32-ounce tank for each engine. We'll be running premium unleaded gasoline with a 100:1 Ace Sawshops oil mixture. This oil has octane, lead and boosters in it.

**RW:** What's your biggest concern, Frank, on flying in the races?

**Schoening:** Avoiding other aircraft. With seven to 10 aircraft going around the turns, I'm hoping the other pilots will realize that if you keep daylight between two airplanes, they won't hit each other. I have no qualms about the airplane itself; it should

perform as expected.

**RW:** How are you synchronizing the engines?

**Scates:** In flight, the engines are no problem to synchronize. You can set them up mechanically with a tachometer. For ground handling, we're using a C&K Ventures twin synchronizer. On the ground, this airplane will turn on its own axis, and this can be a pain in the butt. With this

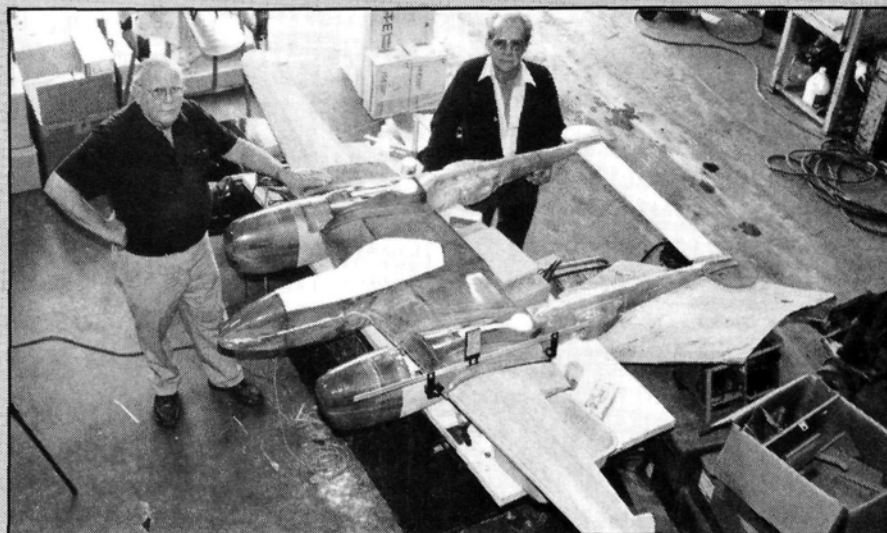
unit installed, at half throttle or less, a touch of the rudder trim will bring the outside engine up by pulsing power to the servo.

**RW:** Frank, are you concerned about having an engine flameout?

**Scates:** No, the reliability and simplicity of the engines is the key. I've flown twins before, and losing an engine is no

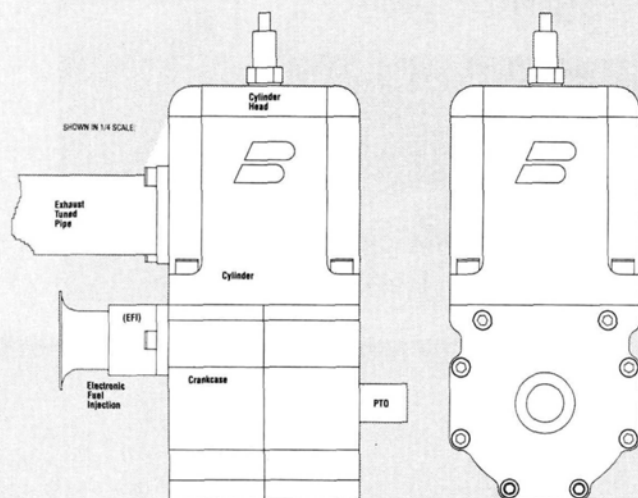
problem—especially when they're close in, like these are.

*If you plan to compete in the Unlimited Races this year, don't take H.L.'s use of the word "fledgling" too seriously. His airplanes are some of the most beautiful I've seen; and Frank has been flying model airplanes since the '20s—a potent combination!*



H.L. Scates, builder/sponsor (left) and Frank Schoening, pilot (right), with their 100-inch P-38 Lightning.

## SON OF SHURIKEN?



**F**red Baldwin, a principal in BV Competition Engines (1163 Country Club Rd., Indianapolis, IN 46234), which offers the Shuriken 1/2A engines, is now working on an engine that's dedicated specifically to the Unlimited Races. Fred, who works out of Indianapolis, IN, notes that the key to designing this engine is building-in both strength and lightness. Power will be the critical factor at the Unlimiteds.

The engine will weigh 12 to 14 pounds and is expected to generate 22hp to 30hp. Fred says it will be easy to start and maintain, and it will be able to run at peak efficiency at a variety of altitudes and atmospheric conditions by using electronic fuel injection and timed ignition.

The engine will have an aluminum piston, a single-ring, chrome-plated bore and an aluminum case. A steel crankshaft, wristpin and conrod will be used, as will top and bottom needle bearings.

Testing of the prototypes will start in June. According to Fred, five fliers are already committed to purchasing one. How much will they pay? Somewhere in the vicinity of \$3,000 each, give or take some change. Also on the boards is a smaller engine for the twin-engine craft that are lining up for the competition. If Fred's new engine illustrates the same innovative approach as the Shuriken did, ships powered by this beast will be hard to beat.

**When the races begin, we should be treated to the spectacle of five to seven expertly flown giant-scale aircraft screaming around the pylons at speeds in excess of 130mph.**

aircraft flown at Reno—only representatives of types that have qualified. Competitors are encouraged to create their own color schemes, and sponsors' names and logos can be included. Easterday and co-founder Cliff Adams felt that increasing the flexibility of the rules would encourage originality in the entries, opening the door to unusual aircraft and making it easier for spectators to identify favorite models. As Easterday pointed out, "Imagine seven identical Dago Reds racing in the final heat. Which one do you root for?" One example of an unusual aircraft that you might see at this event is the P-51 that qualified at Reno with a Lear Jet 23 wing and stab.

Easterday stresses that the event isn't a fun-fly. The goal is to promote professionalism in our hobby and to raise the competition to the level of a sport that's on a par with drag racing, horse racing, etc. An \$8,000 purse goes to the winner. Top Gun and TOC have paved the way for this intense level of competition, and major networks and magazines have expressed an interest in covering the races. R/C models on "Wide World of Sports"? Why not?

As in the full-scale competition at Reno, contestants must qualify by racing the clock; 75 entrants will be whittled down to 30 or 40. Unsafe flying in the qualifying rounds will increase the attrition rate, as will engine and radio problems. When the races begin, we should be treated to the spectacle of five to seven expertly flown giant-scale aircraft screaming around the pylons at speeds in excess of 130mph.

Competition won't be limited to racing. As the name implies, this is a twofold event—Air Races and an Air-Show competition. Originally intended to be a between-heats "filler," the Air Show segment has become an event in itself, with cash prizes totalling thousands of dollars.



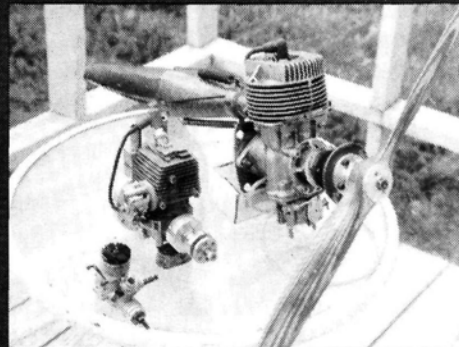
*This competition is limited to duets and teams, and the emphasis will be on precision aerobatics.*

*Estimates of the number who will attend the event vary from 15,000 to 50,000. Since this is the first one, there's no way to accurately predict the total. Madera airport hosts the annual Warbirds Festival, so it's used to crowds. Although there are only two motels in Madera, the airport will be closed down for the event, and 30 acres of grass will be available for campers. Motor-homes must be self-contained, as there are no hook-ups. Located 18 miles north of Fresno on highway 99, the site is roughly in the center of the state, and it's within easy driving distance of Yosemite and other favorite vacation spots.*

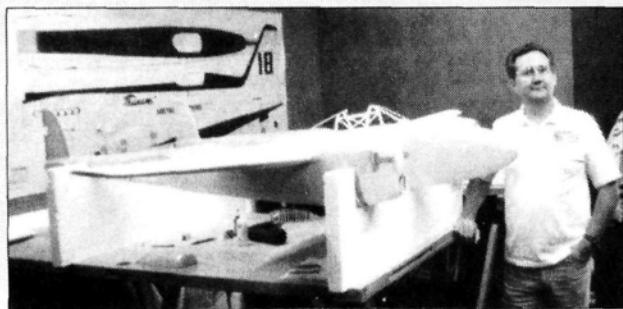
*For more information, call (714) 255-0747, or write to R/C Unlimited Racing Inc., 565 Mercury Ln., Brea, CA 92621.*

## MUSTANG M O T I V A T I O N

**What does it take to compete in Unlimited Racing? Here's an example of one accomplished modeler's efforts. Dan Santich, a former editor of Model Airplane News, plans to mount this engine on a Nosen P-51 that has been extensively modified, not only to take the power of the engine, but also to take the additional stresses of rigorous racing. For size comparison, sitting next to it are a Zenoah G-38 and a Thunder Tiger 40.**



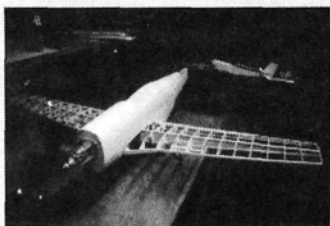
**Though Dan wouldn't say exactly where the engine came from, he did tell us that it's still being refined especially for this event. "It has the potential to be competitive," says Dan. How much potential? Dan reports more than 58 pounds of thrust swinging a 26x14 prop. This 10-pound engine's displacement is 120cc, and if you want to know its rpm, Dan advises you to "Be at Madera in October, and you'll see."**



*Tom Easterday and his P-38, which is being built by Rick Fick.*

**R**ick Fick of Brea, CA, is constructing three aircraft for the Unlimited races: a P-38 for Tom Easterday and two P-51 Mustangs.

The P-38 is from a Malory semi-kit. The kit's parts are of fiberglass and foam, and Rick ordered wood from Lone Star Models for the built-up parts. He's building the kit with E.Z. Lam Resin, glass-cloth and carbon-fiber mat from



*An S.T. 4500 is being trial-fitted to a P-51 that's under construction. The plane is being built from Nick Zirolì plans.*

Aerospace Composites, and he'll power the P-38 with two O.S.

Gemini 300 twins. The bird will use Likes Line Retracts.

Rick uses Robart Retracts in the Mustangs. One of them will be powered by an S.T. 4500; the other will be powered by an A&M Sachs 5.8.

There's only very limited cockpit and surface detail on

these planes; Rick says these pylon racers are built to go fast! Tuned

by TOM ATWOOD

exhaust systems will be buried in their fuselages. For general construction, Rick uses Zap adhesives, and on the fiberglass joints, he uses Hobbypoxy II epoxy and Bob Violett Models milled fiber. Rick notes that the Nick Zirolì drawings were very well-done, but he says he'd really like to see more available—drawings to model the various Reno conversions like the Vendeta, the Stiletto and the Dago Red.

## THUNDER AND LIGHTNING

# RUTAN'S



# RACER

by KERRY J. STERNER

The photo shows my "proof-of-concept" 1/4-scale (exact scale) "Pond Racer." The full-scale plane was designed by Burt Rutan to challenge the 528mph speed record for piston-powered aircraft, and it will compete in this fall's Reno Air Races. I completed the project with the participation of the Bob Pond Racing development team and its Managing Director Dick Rutan. After two years of pursuing the technical drawings so that I could make a model, I received the information I needed in late 1990. Right up to and including the test flights, I sent Mr. Rutan biweekly progress reports and videos.

I was ultimately rewarded with "exclusive production rights" to develop a 1/3-scale Pond Racer for the Unlimited Races, and I'm now developing it. This racer's appearance totally disguises its excellent flight stability. The 1/4-scale concept model uses two Super Tigre S2500 engines (counter-rotating props) and has a wingspan of 75 3/4 inches. Five channels are used to fly the 17-pound airplane, which is equipped with retracts.

The 1/3-scale racer will use engines in the 4.2ci to 5.8ci range and, except for the outer wing panels, its airframe will be of fiberglass. "Exact scale" electric retracts will also be available through Bob Pond Racing. This model's clear canopy will allow a "full-scale" cockpit installation. If you're interested in this plane, which should be available in mid-July, '91, contact Bob Pond Racing at Hangar No. 77, Mojave Airport, Mojave, CA 93501; phone: (805) 824-4608 (ask for Kelly).

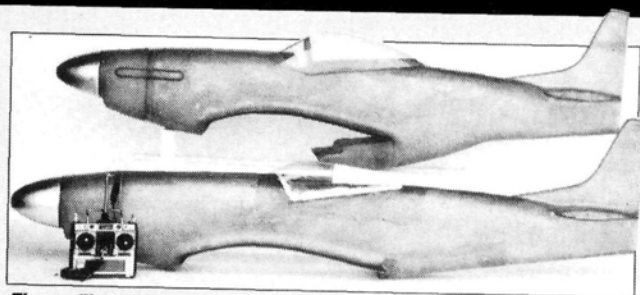
**T**om Easterday's partner, Cliff Adams, has chosen a Spitfire to be the Pace Plane for this year's Unlimited Reno Air Race. Built from a Yellow Aircraft kit, this 1/5-scale, stock model has a wingspan of 88 inches, Yellow Aircraft retracts and full flaps. Powered by an O.S. 300 twin swinging a Zinger 18x8-14 prop and a Dave Platt spinner, the Spitfire weighs 19 pounds.

The plane has been clocked at 90mph, so it

should easily set the pace speed for the bronze, silver and gold heats. Cliff finished the plane with fiberglass cloth and EZ Lam topped with auto acrylic enamel paint and clear coat. It doesn't comply with the race's strict rules, e.g., its wings don't span 100 inches, but its mission is to set the pace for a very exciting race, not to compete.

Cliff is also building an F8F "Bearlyenough" from enlarged Nick Zirolli

# S T I



The profiles of the stock Sky Aviation Mustang and the Stiletto. Note the drag-reducing mods: the Stiletto has the radiator and oil cooler in the wing to allow the removal of the ventral air scoop.

**F**or me, the R/C Unlimited Air Race is a dream come true. I love competition, and I switched from racing top-fuel dragsters to R/C planes because of the expense. After years of flying, the Unlimited Race is what I've been waiting for.

I wasted no time in choosing the P-51 Mustang—a plane that has always been close to my heart—but obtaining a production model that suits the rules wasn't easy. After



# SETTING THE PACE

by PERRY JORGENSEN



ered by a 4-stroke engine (which Cliff built) that will swing a birch 20x18 or 21x18 prop. With a fiberglass fuselage and wings made of foam covered with graphite, balsa and fiberglass, right now, the plane weighs 26 pounds. The paint scheme will be candy red and white, with gold-leaf lettering. How do these beauties look? Pictures will be released only after they've been completed!

plans. This plane will be powered by a new, scratch-built (by Cliff), nine-cylinder, radial, 11.8ci engine that has a gear reduction and a cen-

trifugal blower. The engine runs beautifully and is showing great power potential. Cliff isn't stopping there! Using Dave Platt plans enlarged to

100-inch-wingspan scale, he's also building a P-51 Stiletto called "Excaliber," which will carry modified Robart retracts. It will be pow-

# LETT



by RANDY GRIMES

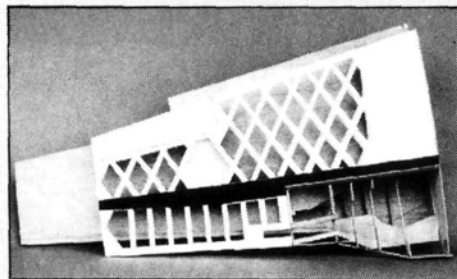
hours on the phone, I connected with Allen Stanford of Sky Aviation (1320 Gay Lussac, Suite 106, Boucherville, Quebec, Canada, J4B 7G4). Allen produces a Mustang P-51 with a 98.5-inch wingspan—a design that's well within the minimum-wingspan rule (100 inches), which allows for a

5-percent deviation.

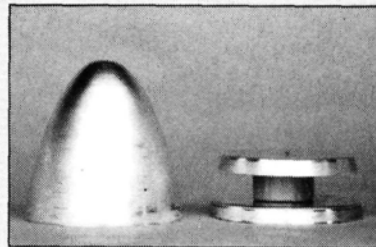
I chose to model my plane after the full-scale Reno Air Racer "Stiletto"—a highly modified plane. Allen soon went to work on a new plug for the

fuselage, and he clipped the wings to about 75 inches (a scale modification that replicates the clipped-wing original). I hoped to wind up with a 25- to 28-pound plane.

I've set up an engine dyno to test combinations of engine modifications and pipe lengths. I'm working with a highly modified A&M 5.8 engine, but I'm also pursuing one of the new Unlimited Race engines being developed by Fred Baldwin, the designer of the Shuriken. Allen Stanford of Sky Aviation will be marketing this new engine, which should be a racers' delight. See you in October!



Compare the Stiletto wing (forward) with the stock wing. The aircraft will weigh between 350 and 400 pounds at the apex of turn 1, so .060-thick FRP spars were added.



On a high-rpm racing wing, the spinner must have one plate behind the prop and another in front.



MINIMAX  
ENTERPRISE

# minimax 700

by DAVID D. GARWOOD

If you study the Minimax\*-700 plans, you'll think that Ron Parcells set out to design a super floater; if you fly the model, you'll know he's succeeded. Here's a new entrant in the light-lift sailplane race, and it's worth a look.

## KIT CONTENTS

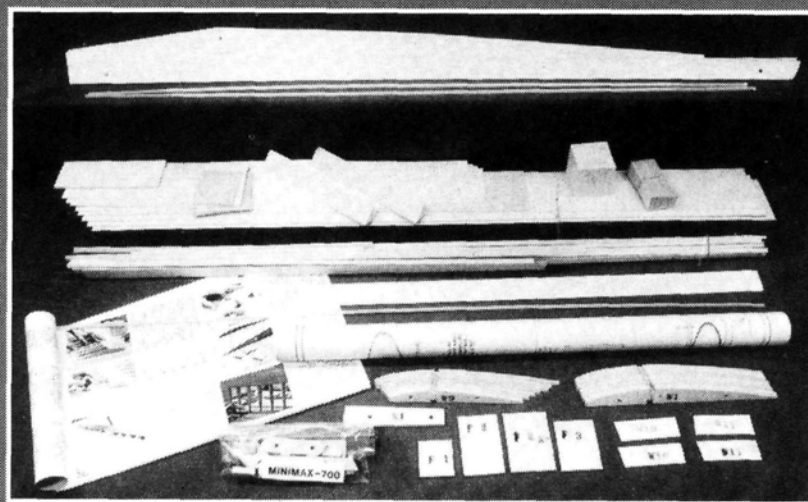
The kit contains an unusually large number of pre-cut balsa parts and all the hardware you'll need. Minimax's careful selection of wood and extensive use of machine-cutting has produced easy-to-build-with parts; nothing is die-cut, and there isn't a single piece of lite-ply in the kit. Those who appreciate well-cut, high-quality materials will be pleased.

**THRIFTY THERMALS!**



# minimax 700

*The kit contains high-quality balsa and all the hardware needed to build the model. It has machine-cut parts and an extensive, photo-illustrated instruction manual.*



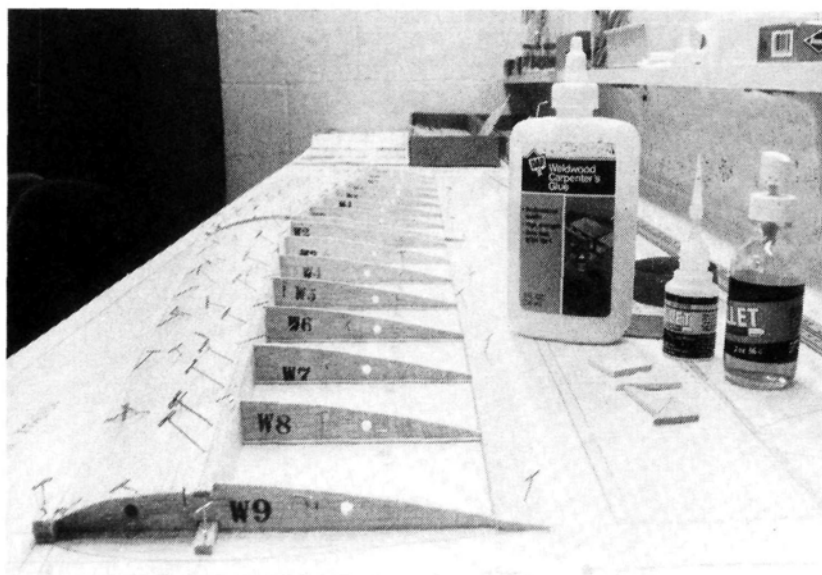
Some unexpected things are provided, including "MINI-MAX-700" tail lettering stickers and a tow hook. The two sheets of full-size blueprints are clear and comprehensive, and the instruction book is one of the best I've seen. This detailed, thorough, 32-page manual features 174 photographs, seven diagrams and 169 numbered paragraphs of building instruc-

also provided. The instruction manual is so good that I think most people could build this model just by looking at the pictures.

## CONSTRUCTION

The Minimax-700 kit, with its high-quality parts, coherent plans and profusely illustrated instructions is easy to build. The model is made entirely of balsa

sheeting. The plans and instructions direct you to glue the  $\frac{1}{32}$ -inch sheeting edgewise to the back of the leading-edge stock, and that requires very precise cutting and a mighty light touch with the sanding block. After doing it that way once, I found a method I liked better. First, glue the leading-edge stock to the ribs and sand it to shape, then glue the  $\frac{1}{32}$ -inch sheeting to the top of the



*The wing panels, which are made of spruce spars and pre-cut balsa ribs, are built flat on the bench, over the plans. This photo was taken after the top leading-edge sheeting had been installed.*

tions. The process of heat-shrink covering is presented in detail to assist those new to the procedure. Information pertinent to slope flying, high-start launching and repairing the model is

using traditional techniques and modern adhesives. The photos with this article will give you an idea of the design details and construction methods.

Here's a tip about the wing

## S P E C I F I C A T I O N S

**Type:** 2-meter sailplane

**Wingspan:** 78 inches

**Weight:** 26 $\frac{1}{4}$  ounces (review model)

**Wing Area:** 720 square inches

**Wing Loading:** 5.25 ounces per square foot

**Airfoil:** Modified Gottingen 385 (flat bottom)

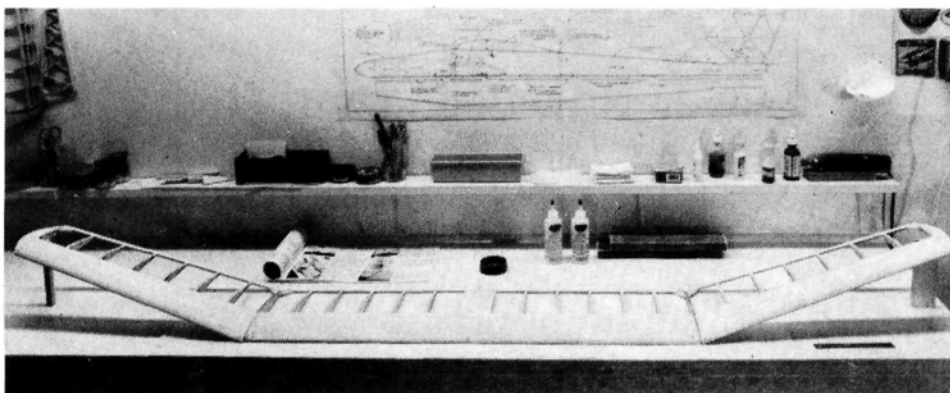
**Power Req'd:** none

**No. of Channels Req'd:** 2 (rudder, elevator)

**Sug. Retail Price:** \$46

**Features:** more than 100 pre-cut parts, complete hardware, clear plans and a profusely illustrated instruction manual featuring 174 photographs compose a quality kit that can be built by newcomers to the hobby.

**Comments:** a super-stable, light air design with outstanding glide performance. This model will be in the air when other sailplanes are grounded for lack of lift.

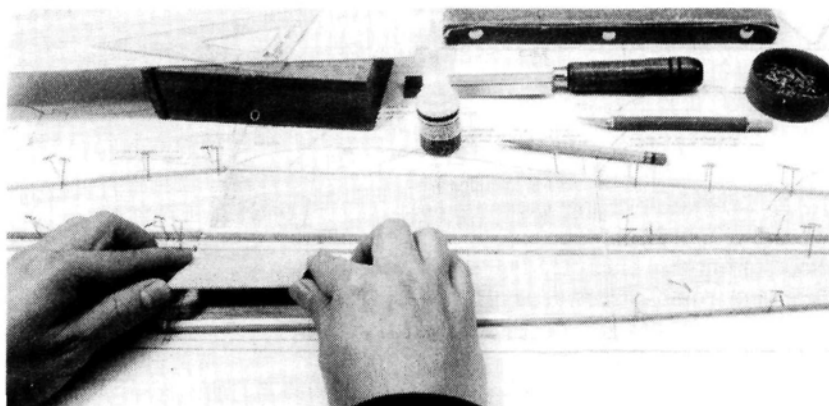


Here, outer tip panels have been epoxied to the center panel to complete the wing structure. A helpful design feature: the hatch serves as a dihedral gauge.

shaped leading edge (to give it a larger contact area) and sand to the final shape.

Another potentially confusing point is that the plans show the pushrods going down the fuselage's side, and the instructions show them routed along its center with a special support block. This gives you a choice. I mounted mine along the side for more support and better access to the tow hook.

If you follow the instructions, you'll definitely have a good flying model, but experienced builders may want to modify one of the pushrod exits and the hatch



Above: I install the fuselage doublers in the wing bay. All the fuselage parts are made of balsa, which is more costly but tougher than the poplar lite-ply of some kits.

**From the first high-start launch, the Minimax-700 showed a strong, steep climb and stable launch track.**

closure. If the elevator pushrod exits at the rear center of the fuselage rather than at the side, it reduces drag, looks cleaner and protects the linkage against landing damage. If the hatch is built of 1/16-inch birch plywood that's fitted to a slightly curved base and mounted with ply tabs, you won't need a screwdriver to open and close it.

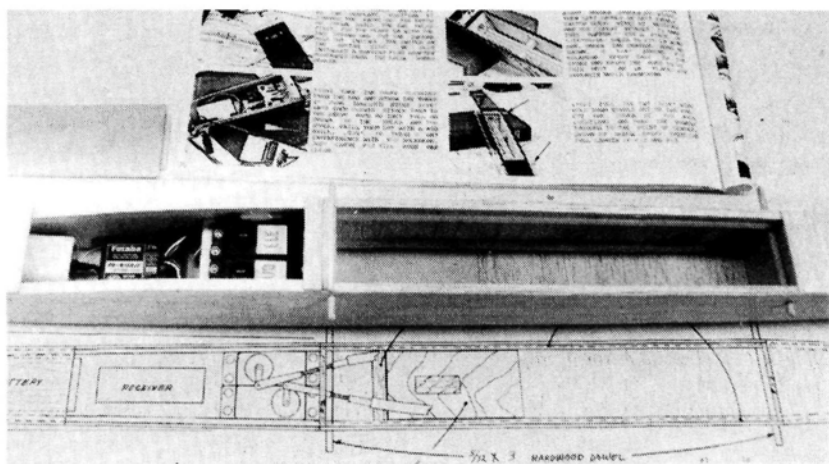
## COVERING AND FINISHING

I sprayed the fuselage with primer, sanded it, then sprayed it with enamel. The wing and tail surfaces are covered with almost two rolls of Balsa USA\* Aero Span. The Aero Span goes on easily, and it looks good. I cut the wing lettering out of Aero Span; the tail lettering was provided in the kit. I spent 38 hours working on this plane.

## MINIMAX MINUTIAE

Standard-size servos fit in the Minimax-700 with very little room to spare. I chose a Futaba\* FP-R102JE 2-channel receiver with a pair of S-148 servos and the optional (wider) F-2 former. The instructions for the servos suggest that you build

Below: The drawing shows the servo arms interfering with each other. (I suggest that you locate the servo arms away from the center of the fuselage.)



a box around them or epoxy them to the fuselage sides. This struck me as excessively permanent, so I screwed them onto hardwood rails. This seemed more practical, and the servos' rubber grommets do help to protect it from landing shocks.

I was unable to find specifications for control throws in the manual or on the plans, but an elevator throw of 5/8 inch up and 5/8 inch down and a rudder throw of

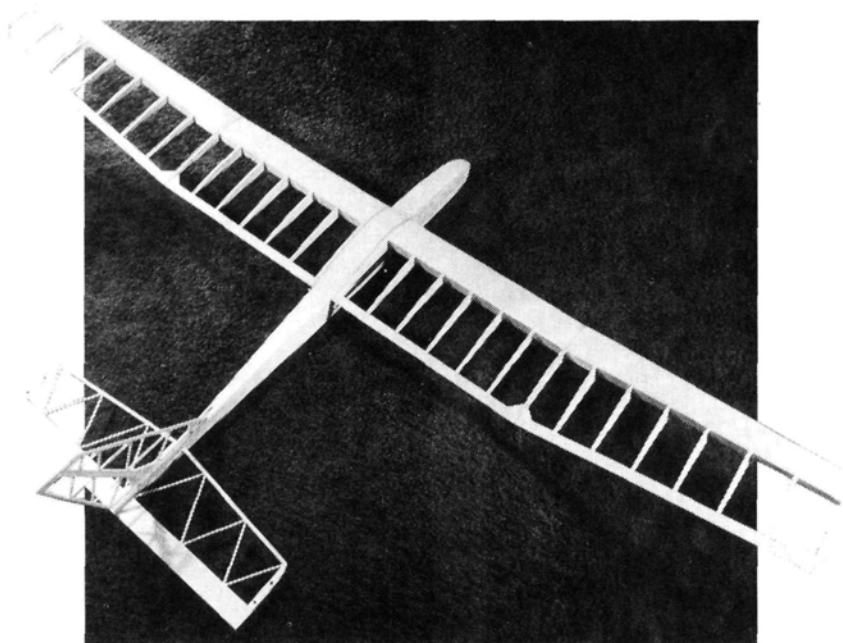
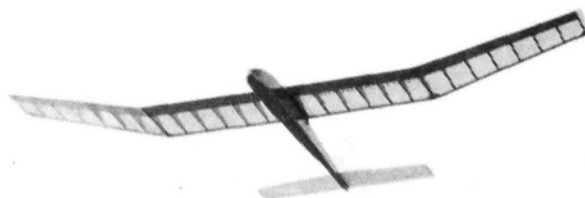
1 1/2 inches to each side have worked well on my model.

It took 3/4 ounce of nose weight to balance the plane at the point recommended on the plans. For flight tests, I added another ounce to the battery compartment.

Finally, I removed the wing warps created by shrinking the covering. This is an essential step that isn't mentioned in the



**This plane's flight is slow, stable and completely controllable, and it responds to the slightest bump of a thermal.**



*The Minimax-700 skeleton is ready for covering. The D-tube wing design provides a light, strong construction and excellent glide performance.*

instructions. To do it, check the wing on your workbench. If you detect a warp, twist the wing in the opposite direction while a helper runs a heat gun or an iron over the covering. Check it again on the bench, and flatten all its panels before flying.

Don't rush the final prep. A nose-heavy glider is sluggish, but a tail-heavy airplane is overly sensitive. Warped wings will make the model fly inefficiently at best, and uncontrollably at worst. To increase your chances of a trouble-free first flight, take the time to check the control throws, carefully balance the airplane and "de-warp" the wing.

## FLYING

Did you turn to this part of the review first? Well, I confess—I wrote this section first, then wrote the rest of the article

from my logbook and the photographs taken during construction.

A couple of hand tosses indicated that the balance, trim and control throws were fine. From the first high-start launch, the Minimax-700 showed a strong, steep climb and stable launch track.

This plane's flight is slow, stable and completely controllable, and it responds to the slightest bump of a thermal. Its turns are unusually flat and stable; its stalls are gentle and it recovers from them with a minimal loss of altitude and no tendency to drop a wing.

After 20 launches, the wind died. I removed the extra ounce of nose weight and prepared for some hand-launch flying. This airplane has an amazingly flat glide and remarkably long "hang time." During my first flying session with the Minimax-700, I was able to hand-launch

it, have it make two circles and then catch it in midair. This is something I've wanted to do for two years, and with this model, it's easy.

One of the tradeoffs with a high-lift wing is that the airplane doesn't penetrate well. If it has a weak point, it's that it can't fly fast and makes little progress when headed into the wind. This isn't a problem in low-wind conditions, and the model is designed for calm conditions or light wind.

There were two other sailplane fliers on the field during this test session, and both of them had a turn at the sticks. The one with 20 years of R/C experience said, "The Minimax must be the king of the floaters." The other pilot, who was new to sailplanes, offered to buy it.

At \$46 for the kit and \$9.78 for two rolls of Aero Span you can build the Minimax-700 for under 60 bucks, not counting adhesives, paint and a radio set.

The Minimax-700 is suitable for new builders and inexperienced fliers as well as for experienced modelers. The kit's high quality and extensive instruction manual will help newcomers build successfully, and the model's slow, stable flight characteristics will help new pilots to soar. On the other hand, the ship's outstanding light-air performance will keep sailplane diehards interested.

When that other flier offered to buy this model, I refused. Instead, I offered to sell him one of my other 2-meter floaters. I don't seem to need them anymore...the Minimax-700 is a keeper.

*\*Here are the addresses of the companies mentioned in this article:*

**Minimax Enterprise**, P.O. Box 2374, Chelan, WA 98816.

**Balsa USA**, P.O. Box 164, Marinette, WI 54143.

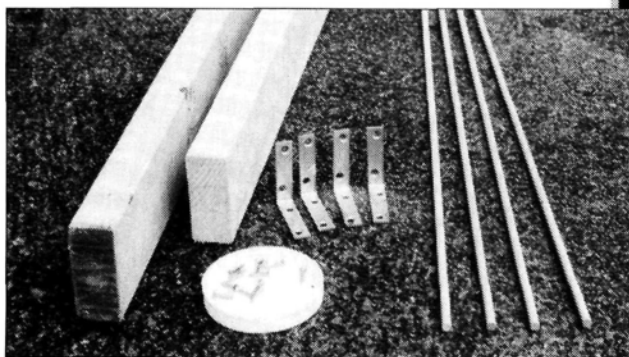
**Futaba Corp. of America**, 4 Studebaker, Irvine, CA 92718. ■

# Build a Wall Wing Rack

by DAVID D. GARWOOD

**A**re your wings stacking up, with no good place to put them? Here's a solution: in 2 hours, with less than \$20-worth of materials, you can build a rack that will keep 20 wings organized and safe.

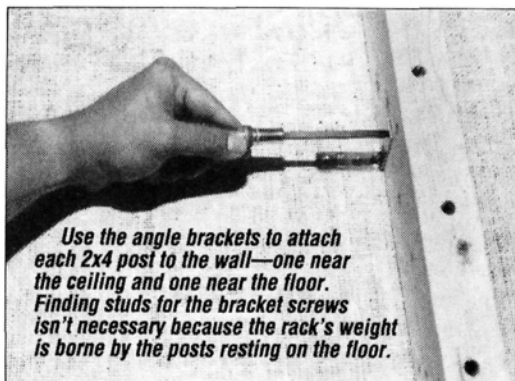
Save  
space  
in  
your  
shop



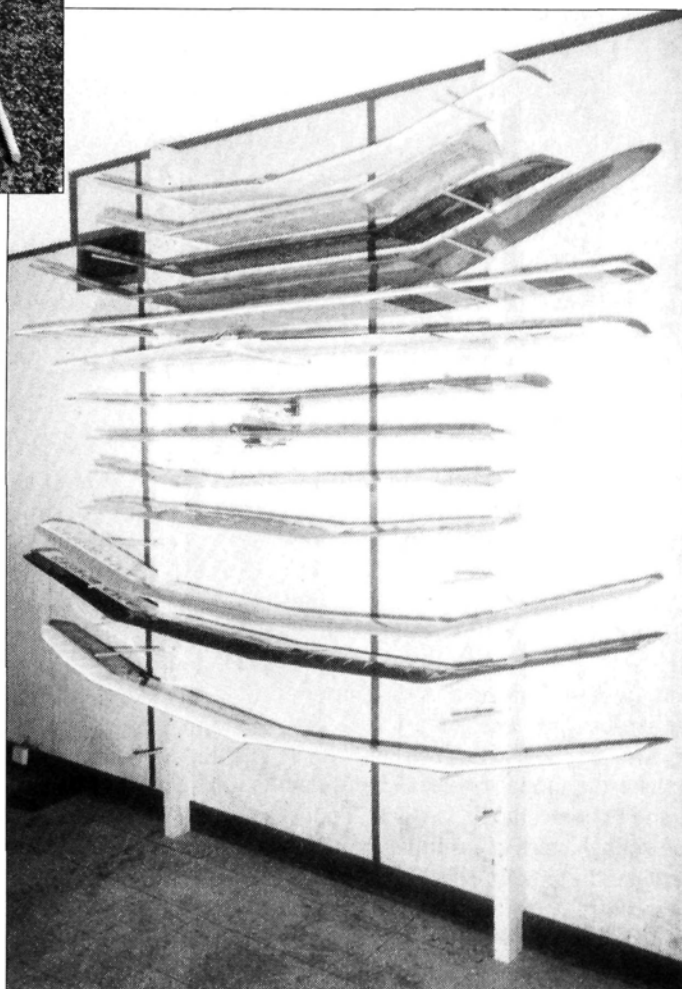
Here's what you'll need: a pair of 8-foot 2x4s (\$2 each), four angle brackets (49¢ each), 16 small screws, (5¢ each) and 20 dowels (45¢ each). That's a total of \$15.76.



◀ Drill  $\frac{3}{8}$ -inch holes into the posts, and insert  $\frac{5}{16}$ -inch dowels. To hold the wings in place, drill the holes at a slight angle so that the dowels tilt upward.



Use the angle brackets to attach each 2x4 post to the wall—one near the ceiling and one near the floor. Finding studs for the bracket screws isn't necessary because the rack's weight is borne by the posts resting on the floor.



As many as 20 wings are now neat and safe. On this glider-wing rack, the dowels are 14 inches long and the posts are attached to studs that are 48 inches apart. Vary the dowel length, dowel diameter, or post spacing to suit your own storage requirements.





by ROB WOOD

A C E S :

*C-123 and Zero models in a spectacular midair collision.*



*These models were used in the film. Clockwise from bottom: P-51A "Messerstang," P-38 Lightning, Soko fighter, Spitfire and prototype jet Ares.*

*climb smoothly into the wild blue yonder. You fly in front of the camera until your fuel runs low, then you head into the approach pattern and execute a flawless three-point landing. You hear someone yell, "Cut and print!," and scene one is complete.*

# IRON EAGLE III

## FLYING FANTASY

*SCENE ONE: You start the engine of your beautiful scale model aircraft, you taxi out to the runway, do an outstanding takeoff roll, and*



# IRON EAGLE III



*A vintage Spitfire and the model Spitfire rest on the tarmac.*

**According to John Richardson, director of the special model unit for "Aces," the R/C models performed so flawlessly that their footage was indistinguishable from that of the full-scale, air-to-air shots.**

Sounds pretty simple, doesn't it? You may have seen some of the recent articles about the growing use of R/C model aircraft in film and television. You consider yourself an accomplished builder and flier, and you fantasize about making "big bucks" doing what you most like to do. Before you pack up the family and head for Hollywood, let's do a little research and find out what's really involved.

I recently had the good fortune to spend three days on the set of "Aces: Iron Eagle III," which

stars Lou Gosset Jr. and Rachel McLish.

Twenty-five full-scale aircraft were used for on-camera and auxiliary work and they included a B-25, which was used as a camera platform. The "starring" aircraft include a Japanese Zero, a Spitfire, a P-38 Lightning flown by Lou Gosset's character and a P-51A that had been modified

to look like an ME-109.

In the story, each of the four WW II aircraft is flown by an "Ace" from the country of its origin. Appearing as a team in air shows around the country, the former enemies and their colorful aircraft draw large crowds wherever they fly. Without giving away too much of the plot, I'll just say that the four end up waging war against a powerful drug lord and his Yugoslavian



*This full-scale Zero replica was built from original engineering drawings for the film "TORA, TORA, TORA."*

*The poor ground-handling characteristics of the ME-109 prompted this conversion of a P-51A to a "Messerstang."*







**A**nyone who's even casually involved with R/C flying is aware of the giant strides taken in the last 20 years. From single-channel reeds that occasionally worked to

well-built models, and at a much lower cost than filming static models in a studio.

The use of model aircraft in motion pictures is nothing new: Paramount's 1927 clas-

wires against a background; "Star Wars" established the now-standard "blue screen" technique (the model is mounted on a pivot in front of the screen and the camera moves around it); and the models in "The Right Stuff" were thrown out of an upper-story window and filmed as they plummeted to the pavement below!

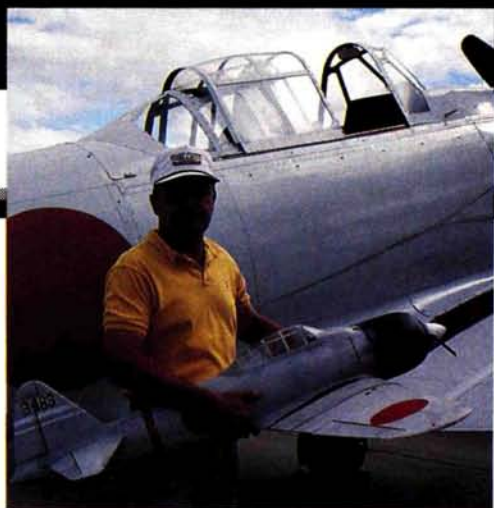
With all of this in mind, are producers and directors now rushing to incorporate R/C models into their films? Sadly, according to professional modelers Tad Krzanowski and Bob Wilcox, the answer is "no." It's hard to keep up with all the advances in low-cost, dependable R/C technology, even if you're actively involved in the field. Imagine a producer or director who's familiar only with studio special effects, trying to grasp the possibilities of R/C and being willing to take chances with new techniques. Those producers who've successfully used R/C in their pictures are traditionally very tight-lipped when it comes to sharing their "tricks" with the rest of the film community. Add to this very human resistance to change the possibility of crashing an expensive model, and it's easy to see why R/C hasn't taken over the special effects industry.

In most fields, change happens slowly and the world of special effects is no exception. One thing is certain: as we continue to explore the universe of R/C possibilities, we'll be hard to stop!

## R/C MODELS AND FILM: A GROWING TREND

computerized wonders capable of storing eight aircraft configurations; from sticks and tissue paper to aerospace composites; from rudder-only to "full-house" controls, complete with scale retracts; the possibilities for realistic aerial sequences seem to be limitless. Recent films such as "Empire of the Sun" and "Miracle Landing" used flying models with excellent results. Maneuvers that would be dangerous or life-threatening to full-scale aircraft and pilots are easily accomplished with skilled R/C pilots and

sic "Wings" won an Oscar for best engineering effects and is still an exciting film to watch; we're still amazed when we watch Luke Skywalker's X-Wing fighter take on the Death Star; and "The Right Stuff" thrilled viewers with realistic aerial maneuvers. As good as the special effects in these films are, we in the audience know we're watching static models; there's a look of artificiality that even the most skillful camera work can't hide. In "Wings," the models were suspended from



Charlie Hillard, the movie's aviation coordinator, with the Zeros.

Soko jet fighters.

### MODEL ACHIEVEMENTS

Why use models when the real aircraft are available? Many of the combat scenes involve explosions, flak from anti-aircraft guns and hair-raising maneuvers. Typically, motion pictures use static models and tricky camera work to shoot aerial action scenes. George Lucas raised this process to an art form with his "Star Wars" movies, and he developed the equipment and techniques that are now considered industry standards.

As slick as studio model shots can be, however, flying models can achieve a much more realistic result at a lower cost. According to John Richardson, director of the special model unit for "Aces," the R/C models performed so flawlessly that their footage was indistinguishable from that of the full-scale, air-to-air shots. John successfully argued with the producers of the film for the use of R/C, and he found an accom-



An inverted Spitfire and its hanging pilot. It's a model!



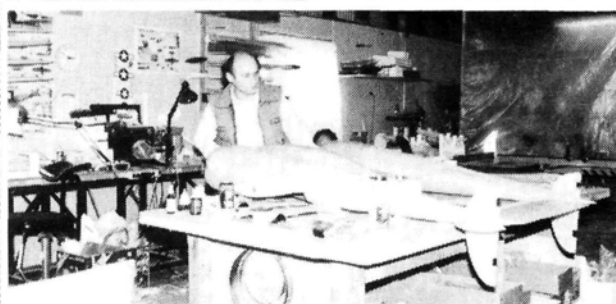
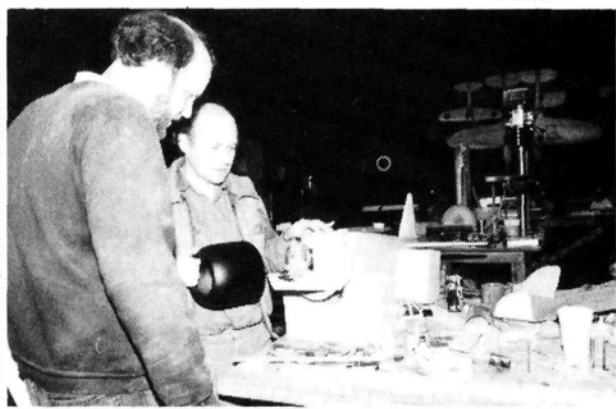
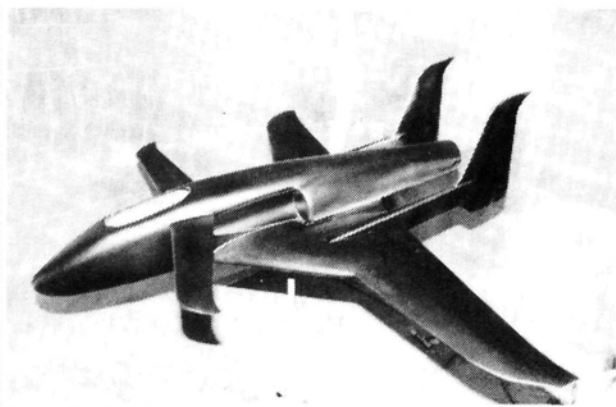
# IRON EAGLE III

plished builder/flier to provide the models.

## ARE WE HAVING FUN YET?

Tad Krzanowski, of San Rafael, CA, took several months leave from his full-time job at Industrial Light and Magic to work on the film. Enlisting the aid of fellow accomplished builder/flier Bob Wilcox and two assistants, Tad accepted the challenge. In just under nine weeks, the team built 19 scale model aircraft! Think about that for a moment: most scale aficionados will tell you that it takes a year or more to build *one* flying scale model! Tad's team visited the Planes of Fame Air Museum in Chino, CA, where they measured and photographed the full-scale aircraft slated for use in the film, so that they'd be able to build accurate, 1/6-scale models. To complicate matters, the Soko jets weren't available but had to be scratch-built from photographs. No two photos had the same color values, and Tad sweated over the results until he arrived on location and compared his models with the real things.

Tad's team worked for nine weeks, seven days a week, from dawn to midnight. Does it still sound like fun? As if the stress levels weren't high enough, the director informed the team that no test flights would be allowed! If the models were to crash, it was deemed better to have them crash on film, so that at least *some* footage would be captured. Imagine flying a model



Top to bottom: This dark finish, which is used to reveal surface imperfections, gives the Ares jet a sinister look. ■ Test-fitting the cowl on one of the 19 models built for "Aces." ■ Tad at work on the P-38 Lightning. ■ An R/C missile is fired from the Spitfire. ■ A B-25B with its tail section removed is used as a camera platform.

for the first time *on camera*!

## 3-2-1 ACTION!

Let's talk about flying for the camera, for a moment. A 1/6-scale R/C model carries approximately 20 minutes' worth of fuel. The pilot must get the model off the ground, regardless of crosswinds, and quickly get into position for the shot. He must fly the plane through the maneuver called for in the script, at the right altitude and attitude and at the appropriate distance from the camera. Without a working knowledge of camera techniques and limitations, the pilot would be unable to perform.

One of the scenes required the pilot to get the model airborne, climb into a convertible "camera car," and fly the model realistically in front of the car at 75mph down an active runway! Other scenes required the pilots to fly in combat configurations and to trigger remote-control explosions at precisely the right moment. Needless to say, the pilot had only one chance to get it right.

For all of us who build and fly R/C aircraft, the increasing use of scale models in film and television is both exciting and personal; we feel challenged by, and somehow a part of, the effort depicted on the screen. Knowing what we do about the gargantuan tasks accomplished by Tad Krzanowski and Bob Wilcox, we can say that there really is "no business like show business"!



# JR X-347

by JOHN LUPPERGER

**C**OMPUTER RADIOS have been around for a few years, but now there's a new trend in their development. In the past, a given radio was designed to perform one type of flying (e.g., pattern, helicopter, or glider) and it would have the mixing and special functions required by that particular sector of the hobby.

With the X-347, JR Propo\* has taken care of those who like to fly a variety of models but want just one radio to do the job. I've just started to explore the X-347's possibilities in a multi-channel glider. It seems capable of performing most of the functions of the more specialized radios, and it has many powerful features designed specifically for sport airplanes, helicopters and glider flying. It also costs \$100 to \$250 less than specialized radios. These pluses should satisfy all but the most critical users.

How do you name a radio that can be used by a variety of modelers? The "3" in the X-347 stands for its ability to handle three types of model: fixed-wing powered aircraft, helicopters and gliders. The "4" means that it can store

four model setups, and the "7" stands for its ability to operate 7 channels. I still haven't figured out what the "X" stands for, unless it's short for "extraordinary"!

The X-347 comes packed in a large carton. The transmitter is in one large foam box (without module); the servos, switch harness, airborne battery, charger and hardware are in another; and finally, in a third, smaller box is the transmitter module and receiver. The transmitter is common to all three types of

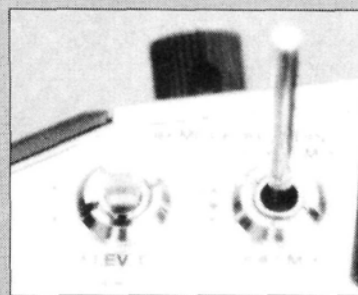
operation; the module and receiver are frequency-matched; and the airborne pack is chosen for the type of aircraft flown. The airplane airborne pack has four NES-517 servos with a 550mAh battery pack; the helicopter pack has five NES-517 servos with a 1000mAh battery pack; and the glider pack has two NES-901 miniservos with a 550mAh battery pack. I'm surprised that the glider airborne pack has only two servos. Any "glider guider" who wants to use the radio's multiple mixing functions would need at least four servos! (Editor's note: JR only included two servos to

achieve price consistency with airplane and helicopter airborne packs).

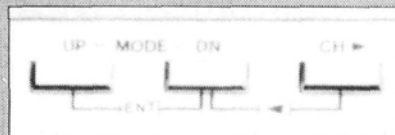
## TRANSMITTER LAYOUT

The transmitter—the heart of the system—is well designed. The case is molded for a comfortable grip, and all the switches are easily accessible on the upper portion of the face and the top of the case. Each function switch and dial knob is marked with an abbreviated description and one or more colored dots to designate its particular function for each of the three basic model types.

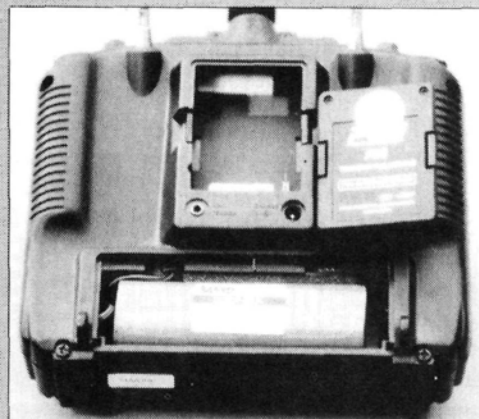
Red dots are used for power aircraft, dark blue dots are for helicopters, and aqua dots are for glider functions. You quickly learn which functions apply to your model (it depends on what mode you're in), and you ignore the other descriptions and dots. I especially liked the fact that the switches are at different heights, because it makes it easy to "feel your way about" while flying



The upper left corner of the transmitter case shows the Flap Mixing switch and the Elevator Dual-Rate switch. The difference in switch sizes makes it easy to find the correct one while flying.



UP-MODE-ON designates the function-select keys; CH designates the channel key.

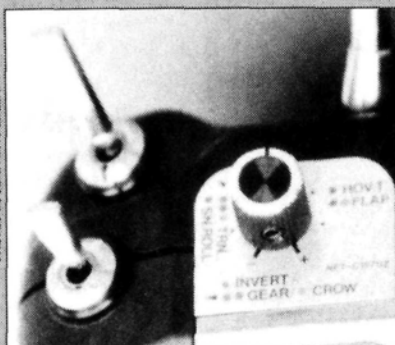


The module fits behind the transmitter and is connected with five pins. The fuse is in the bottom of the module recess, and the small notch in the left side of the recess is for a spare fuse. The transmitter uses a standard 9.6V Ni-Cd that's easily accessible on the transmitter back.

and to find the function switches you want.

Above the control sticks, the computer's LCD screen is large and easy to read. To help prevent flying the "right" model with the "wrong" program setup, a model is identified on the LCD screen when the radio is turned on.

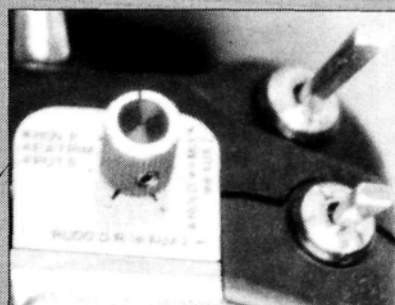
**Three  
radios  
in  
one**



Top left side of the transmitter case has a Flap knob, a Butterfly Crow Mixing switch, and a Timer/Trainer switch. Controls are far enough apart to help prevent accidental switching.



This view of the transmitter's upper right corner shows the glider controls: AUX 2/Dual Flap Aileron Trim knob and Aileron Dual Rate switch. Note the LCD read-out—AFRO (model name); C (PCM designation); 10.2V (transmitter battery voltage).



The top right side of the transmitter case has a Flaperon/Flap Trim knob, a Mixing switch and a Rudder Dual-Rate switch.



The front view shows the smart arrangement of switches, knobs, data buttons and LCD screen.

- 5-year lithium back-up battery
- automatic fail-safe in PCM mode
- PCM or PPM operation
- programmable trainer mode that allows the student to control individual channels separately
- DSC: direct servo control that allows all the servos to be operated without generating a radio signal
- an 8-channel encoder computer system with nearly 1 watt of power output. (The instruction book says eight, although it's called a "7-channel" system.) The transmitter is modular and can be swapped for other frequencies.

## THE RECEIVER

The receiver is a single conversion unit that's listed and approved by the AMA for 1991 operation. Even though everyone says that it takes a dual-conversion receiver to be safe with 20kHz spacing, JR has found a way to meet the requirements in a single-conversion receiver. A big advantage of the single-conversion unit is its size:  $1\frac{1}{2} \times 1\frac{1}{2} \times \frac{3}{4}$  inches. Compared with a dual-conversion unit, it's relatively small—a feature that will be appreciated by electric-airplane and glider fliers.

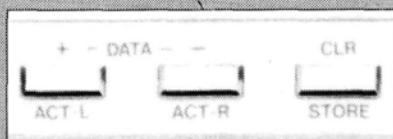
Although I use my X-347

## PROGRAMMING

All programming is done with six buttons located below the control sticks. Even though the programming buttons are on the face of the radio, it's nearly impossible to accidentally change parameters. As a safety feature, you must first turn off the transmitter; turn it back on; then simultaneously push two entry keys to access the main menu. Considering that you might have an airplane, a

helicopter and two glider setups all on one transmitter, this is an important feature.

A nice feature of the LCD screen is its constant display of the transmitter battery voltage. When the display/readout shows "9.0V," the screen flashes "BATT," and an alarm sounds. I once used the transmitter to this point, and I had already enjoyed approximately 2 hours "on"



The + - DATA - - and CLR/STORE keys on the lower right of the case are used to increase or decrease the values of dual rates, exponential, mixing gains, etc.

time—quite respectable for a computer radio.

The transmitter's many other features include:

- sticks that are adjustable in both length and tension
- ratchet or smooth travel on the throttle stick



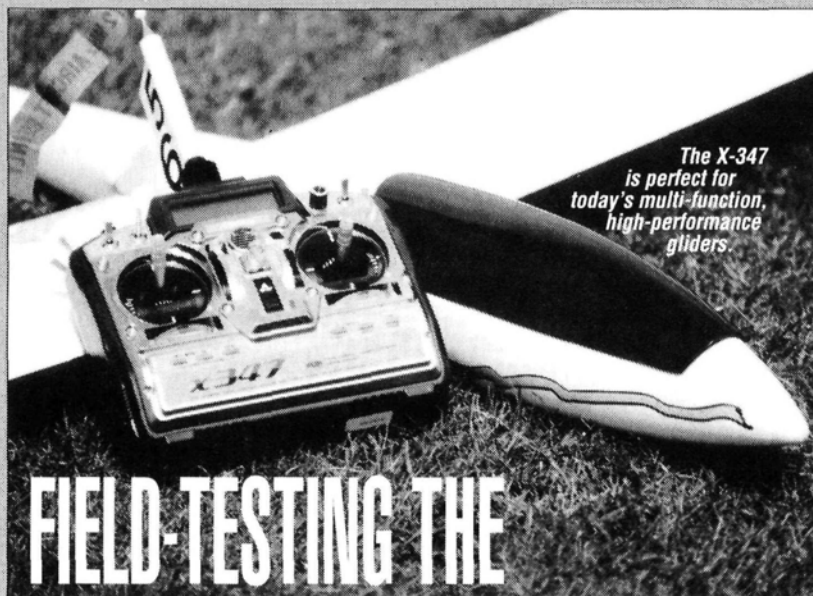
**M**Y TESTS OF THE X-347's ability to live up to its manufacturer's specifications were made in the field—my lab! My test equipment is my aircraft and everyone else's radio. I don't have any fancy scopes, meters, or test equipment. I think the manufacturers of today's equipment make honest claims about the specifications of their products. (They have to pass independent testing to achieve the AMA Gold Sticker status.)

First, I tested the X-347 at the flying field. I found that some of the settings I had chosen on the workbench (e.g., dual rates, mixing values, etc.) were a little high, and they had to be toned down. (Remember to take your manual with you to the flying field.) The initial flights went well, and I was pleased with the feel and general operation of the X-347.

The interference test was next. I fly at a field where there's often 15 to 20 sailplanes in the air! I waited until the sky was filled with planes and launched. The Aphros was way up in a thermal when I walked directly into the middle of the pilots' area. There were about 15 aircraft in the air, but I never felt that the link between my transmitter and receiver had been broken. On final approach, I even

put several pilots between me and my model. It came in without a glitch; if the fail-safe feature did come into play, I was unaware of it.

My next test was performed at a local slope-soaring site. The pilots stand on the edge of the bluff within a couple of feet of one another. The models are flown close in, and in very close proximity to the transmitters. At this site, I stood behind the other pilots and flew my model at about eye level, back and forth across the hill. This meant that as many as 10 transmitters were directly between my transmitter and my model. Since my model was usually below the height of their transmitter antennas, if I was going to experience interference, it would surely happen here. Again, the X-347 performed without the slightest glitch.



The X-347 is perfect for today's multi-function, high-performance gliders.

## FIELD-TESTING THE JR X-347

### THE MANUAL

The 120-page instruction book is divided into airplane, helicopter and glider sections. Each section takes you step by step through the fundamentals associated with its particular aircraft type; then it covers the full setup with all the options available in a particular configuration. At the end of each section, there's a data sheet on which to record the details of your setup (useful as a point of comparison and in case of a failure in the lithium back-up battery. JR notes that the lithium battery has an expected lifetime of five years).

### USING THE X347

To use as many of the radio's features as possible for this review, I installed it in the Aphros—a multi-functional glider. The Aphros is a 3-channel vee-tail ship that requires mixing for the vee-tail, mixing for coupled aileron and rudder, and mixing to

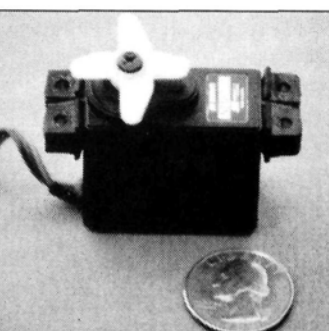
allow the ailerons to double as spoilers. Have your model in front of you as you use the instruction book. To enter the System Setting

(Continued on page 78)

in a glider, I equipped the airplane airborne pack with four NES-517 servos. These are standard-size servos with 40.2 inch/ounces of torque.

They're relatively fast, and there seems to be no slop around neutral. They also center perfectly and operate smoothly. I haven't seen the

NES-901 mini-servos, but I assume their smaller size allows them to be mounted in a glider's wing for ailerons and flaps.



The NES-517 is similar in size and output to most standard servos.



The single conversion receiver is quite small compared with the dual-conversion units, yet it meets all the AMA's 1991 requirements.



The 550mAh airborne battery pack is common to the airplane and glider versions of the X-347.





Contributor David Baron assists with pre-flight check.

## FIELD & BENCH REVIEW

**S**IX OR SEVEN years ago, when ARFs started to attract attention, the emphasis was on how much they cost, the ease of their assembly and, of course, how they flew. Their appearance was less important. Now that modelers have become a little jaded about the instant-airplane world, ARF manufacturers have responded by producing all types of scale ARFs: Caps, Cubs, Lazars, Extras, Christen Eagles and Chipmunks; and, even more recently Mustangs, Warhawks and Focke Wulfs. The Acrostar 60 is a product of this trend.

The Futaba\* Acrostar 60 is a semi-scale version of the highly innovative plane that was designed, built and flown by Arnold Wagner, a member of the Swiss aerobatic team in the early '70s. The full-scale Acrostar was a no-compromise design. Not only was it created specifically for aerobatics (with a fully symmetrical airfoil), but it was also the first full-scale plane to have flaperons and coupled elevator and

flaps (control-line models were the first to have coupled flaps and elevator).

Wagner worked extremely hard to build the plane, and he fought strenuously against the bureaucrats to get the unorthodox aircraft certified. Before going on to the World Championships, the Acrostar won a double victory at the Swiss championships in 1970. Wagner had accomplished all this by the time he was 29.

The Swiss military was kind enough to give him time to finish his "Handbook on Aerobatics," as well. It seems that Wagner spent 10 days in the brig for betting a fellow reservist that he could hit a pistol-range target from the air—he won. But I digress...

The Acrostar 60 is a .60 2-stroke/.90 4-stroke pre-finished model with a 57-inch span and an area of 600 square inches. The kit has the triple-skin lamination over the inner skeleton of balsa and ply that's become so familiar in the EZ line of ARFs. The kit also has the same

# F U T A B A ACRO 600 SWISS PRECISION!

by CHRIS CHIANELLI





## ACROSTAR SPECS

**Type:** Semi-scale/pattern  
**Wingspan:** 57.09 inches  
**Length:** 52.75 inches  
**Weight:** 6 pounds, 10 ounces  
**Wing Area:** 600 square inches  
**Wing Loading:** 24.8 ounces per square foot  
**Power Req'd:** .60 2-stroke/  
 .90 4-stroke  
**No. of Channels Req'd:** 4 (ailerons, rudder, elevator and motor)  
**Sug. Retail Price:** \$344.95

**Features:** The 90-percent-assembled kit includes everything you'll need (hardware, motor mount, tank, wheels, etc.). You supply the radio and the engine.

**Comments:** The Acrostar 60's parts fit is excellent, but the translucent decals do leave something to be desired. Flight was deceptively fast and very accurate. During final approach, the sink-rate was predictable and no "falling off" was noted.

**CAUTION:** IF YOU HAVE AN EARLY KIT, DON'T FOLLOW FUTABA'S METHOD OF BALANCING IT. YOUR PLANE WILL BE DANGEROUSLY TAIL-HEAVY. Our final balance point was 25 percent from the leading edge.

style of motor mount as the EZs do. I wouldn't be surprised if this model came out of the same factory as the EZs. Of course, I can't prove this, and it's not important, even if it's true. What's important is that the Acrostar is a beautiful ARF—it's top-drawer.

## FIRST IMPRESSIONS

When box-opening time comes, it's apparent that a lot of research and development has gone into giving modelers this high a degree of polish. The parts fit is excellent, the color match of the ABS and triple-skin parts is quite good (something of a problem in previous kits of this type), and the instruction booklet has dozens of clear photos of assembly procedures.

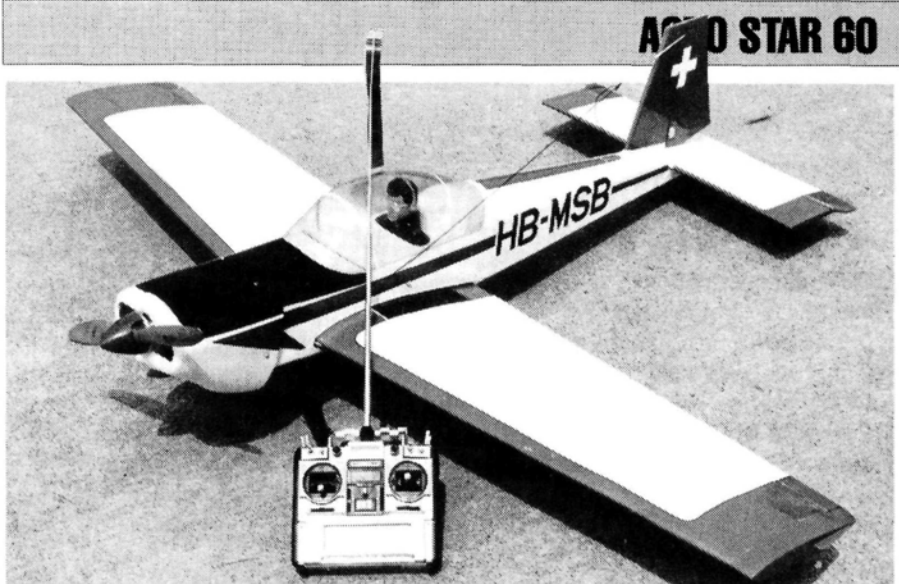
I didn't like the stick-on decals. They went on well, especially with a little heat for compound-curve areas, but they're translucent. Covering white areas with translucent red de-

cals makes things come out a bit pink; oh well...Arnold Wagner must have had a sense of humor, so should we—no big deal.

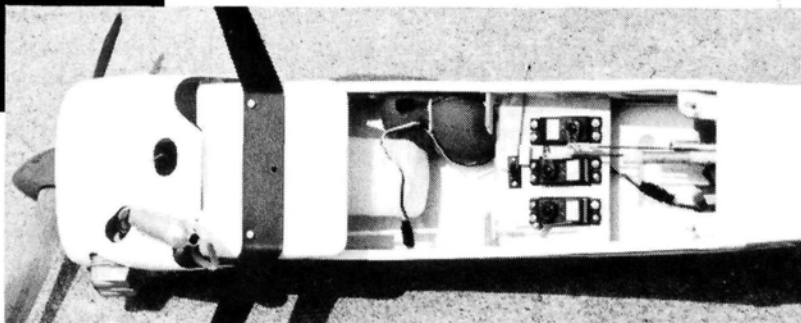
the Acrostar while watching "Star Trek" (old versions of course), although I don't recommend it. It's kind of a waste of space to go over the as-

sembly here, especially since I couldn't do it as well as the booklet does, but there's a step I disagree with: the booklet tells you to glue the belly pan as the final step in wing assembly, then to fit the wing to the fuselage for bolt installation. My advice is to fit the wing on the fuselage, bolt it down and then glue on the

belly pan. You can get a much more exact fit between the pan and the fuselage after the wing has been mounted.

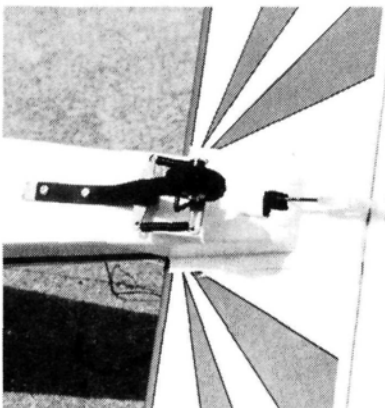


On the ground or in the air, the Acrostar, with its Futaba 1024, is a beautiful plane. The cowl is made of nearly indestructible polypropylene.

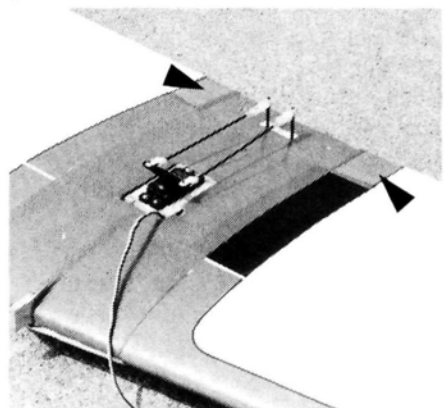


You could fit four radio systems into the Acrostar's compartment. The battery is behind the servo; it counteracts some of the nose-heaviness caused by the oversize engine. Pre-drilled holes for the engine mount angle its head down at 45 degrees. This way, the muffler exits the bottom of the fuselage and leaves the model relatively clean after a day's flying.

Between the great instructions and the excellent parts fit (that includes the fin and stab root cover, which can be a problem in this type of kit) you could build



The central exit of the elevator pushrod is very direct and leaves the model looking much cleaner. The steerable tail wheel looks exactly like the shock-absorbing coil-spring types used on EZ kits.



Although the color match of the ABS parts and the rest of the fuselage and wing markings was good, the stick-on decals were translucent. Notice that the trim decals on the trailing edge allow the white it's supposed to cover to show through.

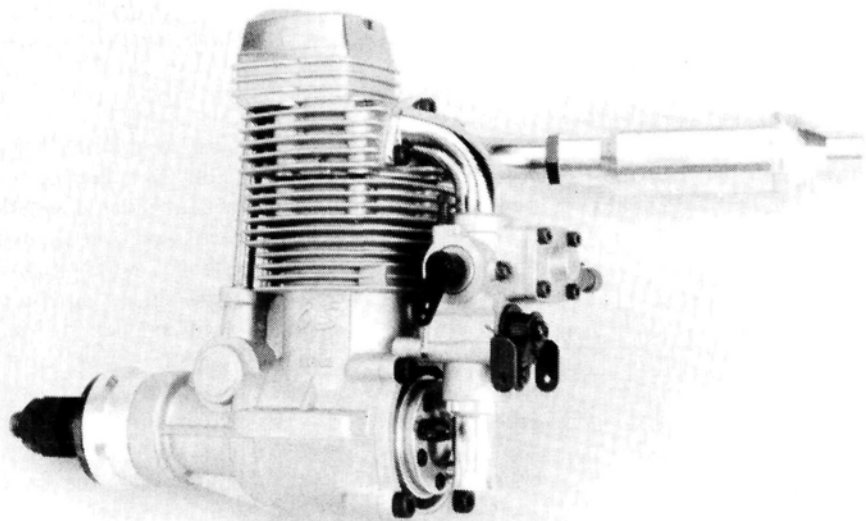
## ACRO STAR 60

### HEY! WHO PUT THAT FENCE THERE?

Another tale of misfortune is in order. With every ARF of this type I've ever built, I've *always* discarded the metal bolts and replaced them with break-away nylon bolts; this time, I didn't. You guessed it! One of the wing tips hit a fence, and that tore out the fuselage sides. Had I installed break-away nylon bolts, the fuselage would have

### EASY DOES IT

Test day was sunny, and very, very windy. After safety precautions had been taken and the Surpass II had been run-in—past being critical on needle setting—we were ready. To a point, I've trained myself to ignore my nerves and apply throttle. With this plane, an attack of nerves is unwarranted. You might believe it, you might not, but I'm telling you: only a *little* up-elevator trim—re-



*In terms of power and weight, a good 4-stroke .90 is the perfect engine for the Acrostar, but I couldn't resist using this new O.S. 1.20 Surpass II fire-breather. At first, the Surpass II was quite critical on needle-valve setting—more so than other O.S. engines I've used. After running through three or four tanks of fuel, the needle settings were less sensitive, idle was very reliable and the engine turned a healthy 8600rpm with a 15x10 Zinger prop—and oh! that sound!*

been fine. Well, the Acrostar was easily repaired and is flying again. Get nylon bolts, and thread the wing blocks that are provided—it's worth it.

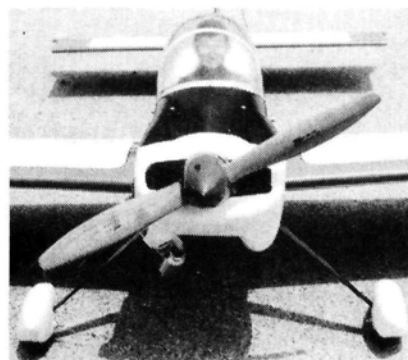
I tried getting my hands on a .90 4-stroke, but I wasn't tenacious enough in my quest. I had a new O.S.\* 1.20 Surpass II that was conveniently waiting to be put to service, so in it went. It's not all my fault! The Acrostar's seat-of-the-pants appearance brings out the barnstorming hot-rodder in the best of us.

After break-in, with a Graupner\* 14x11 prop on its nose, the Acrostar proved to be a forgiving fire-breather. Even with the battery mounted behind the servos, this plane is still a little nose-heavy, but not overly, so I didn't add tail weight until later in the test flight.

member it's still nose-heavy—and a *little* right rudder were needed on its first flight (probably to counteract the 15x8-10 prop that was slightly big for this airframe). It needed so little trim, in fact, that no adjustments were needed on the model at all.

The first flight was little more than more engine break-in, but I threw in some rolls and some inside and outside large maneuvers. The rolls were very axial, and no "corkscrewing" was detected during the inside/outside maneuvers. I tried to put the plane through a few snap maneuvers, but the entries were abrupt and aesthetically unappealing. This, coupled with the fact that the elevator got very mushy at lower air speeds, pointed to a nose-heavy model; time to add that tail weight.

Incidentally, you definitely don't need all the power I used—it's unnecessary.



The tail-weight solution will never enter the picture if you approach your power-plant choices more sanely than I did. After 3 ounces of lead had been stuck to its tail, the Acrostar was much closer to being the trimmed stunt machine that it was meant to be. Inside and outside maneuvers required much less elevator input, with the lower drag benefit that comes with it. Entry into snap maneuvers became beautifully graceful and predictable, and flares at landing time were 100 percent more responsive. On the subject of landing, the extra weight from the large motor and the tail weight didn't spoil the Acrostar's slow-flight characteristics, so they should be that much better on *your* .60 2-stroke/.90 4-stroke-powered version.

Some fellow warned me that not having the rudder pass below the elevator could cause a "blanketing" effect, and that pulling out of a spin could be a problem. So far, it hasn't happened; I think the danger comes during flat spins where down-elevator and full motor are the only things that could possibly save the day. Arnold Wagner had this problem with the full-scale Acrostar, and on one occasion, it took him more than 22 turns to come out of a spin. I'm not saying Acrostar has spinning traits more dangerous than those of other models; as far as I can tell, it doesn't. Maybe Arnold's engine was secretly too big also and he, too, had to add tail weight...maybe he added a little too much.

*\*Here's the address of the company featured in this article:*

**Futaba Corp. of America**, 4 Studebaker, Irvine, CA 92718.

**O.S. Engines**; dist. by Great Planes Model Dist., 1608 Interstate Dr., P.O. Box 4021, Champaign, IL 61824.

**Graupner**; dist. by Hobby Lobby Int'l., 5614 Franklin Pike Cr., Brentwood, TN 37027. ■



# FLOATING

## A R O U N D

by JOHN SULLIVAN

### Teachers recruiting for our future

**H**AVE YOU NOTICED lately that everybody at the field (or lake) is getting older? I mean the average age of modelers is going up. The last time I read about this phenomenon, the mean age was 31. Not enough young people are taking up R/C flying. The ARF explosion hasn't helped and nei-

teachers who live in the Napa Valley, CA. Mike and Rocky are both experienced R/C pilots who, working independently at first, realized that model aviation was an excellent tool with which to teach science. The problems they faced were the cost and initial complexity of R/C equipment; the solution, in both cases, was to use control line models!

Mike and Rocky teach at different schools, but each eventually heard about the other's efforts, and shortly after that, I was invited to visit them at Mike Dirkson's school in Angwin, CA. Talk



*Cesar Diaz learned a lot in Mike Dirkson's control-line class. Cesar (age 14) is shown here with his just-completed Kraft Air T4C. He's currently working on 32-inch floats for the trainer.*



*Sixteen-year-old Mike Amerson with his 8½ pound, S.T. 90-powered Zlin on 40-inch Sullivan floats. Since his introduction to R/C 14 months ago, Mike has accomplished much (courtesy of the control-line group!).*

ther has the tremendous popularity of R/C cars, which attract thousands of youngsters.

In view of this, here's an effort that deserves our attention. The heroes in this story are Mike Dirkson and Rocky Ferrario—a couple of middle school science

about rekindling old flames! It seemed as if I'd stepped back 36 years and it was 1955 again! The pit area was strewn with every kind of field box imaginable, from shoe boxes to ammo crates. There were Ringmasters and Noblers and Flying Wings—their conditions ranging

from pristine to "early duct tape"—and, in the center of a 120-foot grass circle, several wooden, aluminum and plastic control handles were hooked up and ready to go. Take me back!

Before long, the first Fox 35 was fired up. Mike Dirkson and a very excited student ran out to the center and tested up-elevator. The big-eyed little guy gave a "thumbs up" for the release, and the Screaming Fox pulled and bounced the Nobler over the grass for about 35 feet—and into the air. The first couple of laps were

tense, and there were some scary swoops toward terra firma, but after that, it was pure déjà vu. I mean, how long has it been since you saw the glint of the afternoon sun on a taut pair of 60-foot wires, or heard an unruffled Fox trying to tear itself apart, or smelled that hot, castor-oil elixir of youth drifting across the pits after each screaming circuit? It was absolutely wonderful!

So, you might ask, what does this have to do with float flying? For one thing, after just two years of operation, this group has had five students



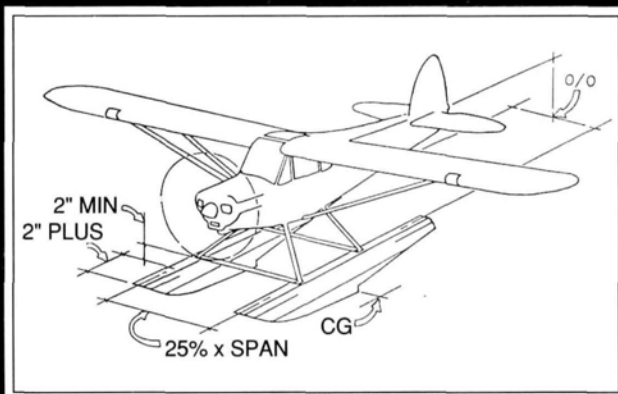
*Doug MacMillan, Alf Lea and Roy Forsey built this traveling ramp to launch float planes from a sea wall in Alberta, Canada. (See text for more on "hard times" float flying!)*

# FLOAT BASICS

**M**y subject this month is the question of correct float attitude relative to the fuselage and flying surfaces. When properly mounted, floats on full-scale planes exhibit a definite droop, or negative attitude, and I admit trying to emulate that setup when I first started writing about model float setups. It's an easy trap to fall into: the full-scale guys do it, so why shouldn't we? The problem arises through not playing with a full deck; more specifically, not considering Reynolds efficiency and power-to-weight ratios in addition to angle of attack and incidence.

The first person to react to my early ramblings was Mitch Polling, a veteran electric floatplane modeler. "Think of the tail group as feathers on an arrowshaft," Mitch advised. "With the elevator at neutral and the stab parallel to the fuselage datum line (most models are set up this way), a floatplane running at step taxi will be parallel to the surface of the water. If the floats are installed with negative incidence, the pilot must make his run with slight up-elevator to keep the forward portion of the float from plowing and 'wheel-barrowing'; this, in turn, will increase the wings' angle of attack and that could result in premature takeoff, a stall and a dunking."

I immediately called Jay Frey, vice president of operations at EDO Float Company. "We would love to mount floats parallel to the datum line in full-scale applications," Jay explained. "We could then eliminate the frontal area 'mouth,' which translates into a lot of drag." Jay went on to explain that the higher Reynolds efficiency of full-scale floatplanes enables even a heavily burdened floatplane to become airborne at a



*This illustration gives you the basic requirements for attaching floats. Position the float step under the model's design CG, and then rebalance it.*

relatively high angle of attack without stalling, and that the alternative (longer, faster, takeoff runs with floats further reinforced to take the pounding, and increased passenger discomfort) was unacceptable.

It might still be argued that a highly powered R/C model could pull its way out of any situation, even if the floats were drooped for scale purposes. It's true in that case, but you can't make a recommendation like that and still cover the cases where the additional float weight has decreased a model's takeoff power from adequate to marginal. The objective should be to set up your floatplane so that you have the option to rotate and lift off when the plane has achieved takeoff speed; the best way to accomplish that is to begin with the float deck parallel to the aircraft's datum line and stab.

In our upcoming annual float issue (October, '91), "Float Basics" will feature photos of several modelers' approaches to water-rudder systems and float-gear setups. Don't miss it!

"graduate" into R/C flying. One of them, Mike Amerson of Angwin, CA, has become a fearless builder and has developed flying skills that may lead him to International Miniature Aircraft competition. Another student, Cesar Diaz, has framed a Kraft Air T4C and is finishing his first pair of floats. The control-line program has provided its students with a thorough, yet relatively simple, introduction to modeling and many scientific principles. After building a profile fuselage and a built-up wing and hooking up bellcranks and

pushrods, the transition to built-up fuselages, servos and three-dimensional flying is the next logical step rather than an overwhelming first project.

Dick Lemme, president of the Marin R/C group, heard about the program and encouraged Marin R/C fliers to clean out their basements and garages; they delivered a station-wagon full of control-line kits and equipment to Dirkson's group. Support for the program is expanding. This growth seems to be limited only by the number of teachers who are familiar with the hobby.

The bottom line is that Mike Dirkson and Rocky Ferrario have found an excellent way to teach science, and it just happens to strengthen our sport. Those of us who've had an opportunity to work with the kids or to contribute to the activity feel remarkably rewarded, and I recommend that you all participate if given an opportunity. In this case, what goes around truly comes around.

## THE FLOATING MAILBAG

**F**loat fliers are adaptable out of necessity. Name

another segment of model aviation where you need a boat, rubber boots, beach towels, sunscreen and the occasional scuba outfit to dive for that sunken Saito Twin. Now, Doug MacMillan of Calgary, Alberta, Canada, has come up with another piece of float-flying equipment. Doug and his friends fly at Alf Lea's summer home in Calgary, on a manmade lake where there are "sea walls" in front of many of the homes.

Doug, Alf and fellow flier Roy Forsy wanted to be able to prep their models on firm ground (instead of on a heav-

*(Continued on page 76)*



# THE SCHNEIDER CORNER

**T**HE SCHNEIDER RACE at the Nautical Inn, Lake Havasu City, AZ just might be the most exotic R/C event in model aviation! Whether you're a contestant or spectator, it's a winner! Dates for the 1991 race have been confirmed, and they're as follows: Thursday, October 31: pre-inspection for early arrivals (no flying on site); Friday, November 1: static judging and speed trials; Saturday and Sunday, November 2 and 3: pylon races and awards.

Event Chairman Bob Martin has moved his model manufacturing facility and the Schneider Headquarters to a new location: 1520B Corona Dr., Lake Havasu City, AZ 86403; phone: (602) 855-6900. It's impossible for me to include all the information I've received from Bob and the Desert Hawks about the Schneider Race and Fun Fly, so it's important that you subscribe to the Schneider newsletter for rules, entrant information, publications, etc. The newsletter costs \$5 a year, and it's well worth it.

Bob has responded to my "belly problems" jab (May '91) with the following information. "To improve water handling on the Schneider Racers, contestants will be allowed to modify longitudinal sections of floats, i.e., repositioning steps and establishing flat keel areas, in excess of 10 percent variation, *providing* the float's scale *cross section* is maintained within 10 percent." In other words, we can modify our floats' lengths more than 10 percent, but not their widths. This will allow improved performances while maintaining scale "vee" configurations, scalloped bottoms and the like. This rule change will make it possible for any entrant to simulate credible performances on the water, and I applaud Bob's approach to the problem. It's genius!

Readers who have been following the saga of the Savoia S.65 will be pleased to know that we've solved our engine problems. After ripping everything else apart on the G62, Mike Johnson finally located a gasket kit for the Walbro carb and overhauled it. Imagine Mike's surprise when he dismantled the carburetor and found two fruit flies lodged in the fuel-supply passage! Don't even ask how we

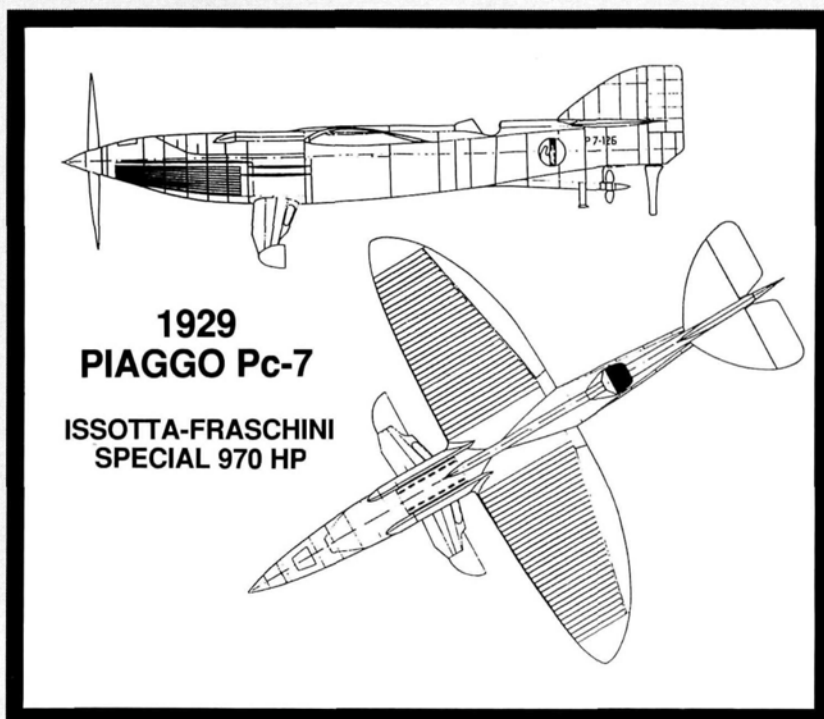
think the flies got in there. Was this a factory "mod"? Did the flies get pumped in with the gas? Were the flies living in the gas line when we installed it? Did Katie Martin (Bob's wife) put them in there? As you can see, we have all the questions covered—just no answers. At any rate, we picked up 400rpm after getting the bugs out of the Zenoah, and we're working on an ignition system and new props.

This month's Schneider study is the 1929 Piaggio Pc-7. The two views shown were taken from Bob Banka's scale-views sheet (you can contact Bob at 2334 Ticonderoga Way, Costa Mesa, CA 92626) and, to my

was clutched in to take over propulsion while the water prop was disengaged. It never worked—at least, not in 1929, when the Piaggio crew kept blowing up the airscrew clutch at transition. If you know Mike Johnson, that's reason enough to start building a Pc-7.

Here's a short list of design considerations that I've submitted to Mike:

- To meet the 84-inch Schneider Recreation wingspan rule, the fuselage must be over 11 1/2 feet long!
- With a target weight of 25 pounds, a water prop, shaft, clutch, gearbox and rear power takeoff must be scratch-built to move the



**The 1991 Schneider Race re-creation will celebrate the sixtieth anniversary of the last Schneider Race. This Piaggio Pc-7 won't be there! (See text for explanation.)**

knowledge, this sheet is the only information available at this time. Without a doubt, the Piaggio is the wildest of the Schneider designs and, as such, it qualifies for the "Mike Johnson Favored Project of the Year Award," which also means I've been sucked in to work on it with Mike.

The original Piaggio was powered by a 970hp Isotta-Fraschini engine. At rest, the Piaggio would be swamped in the water, so all surfaces below freeboard had to be watertight. After start-up, power was applied to the underwater prop while the airscrew was held at stop in a horizontal mode. When sufficient speed had been obtained to raise the Piaggio onto its hydrofoils, the airscrew

Piaggio from a standstill to 40mph on the hydrofoils!

- The engine (probably water-cooled and located amidship) will have to drive the airscrew on a shaft with a cone clutch somewhere in between!

That's just for starters! Mike is undeterred, and I have a headache! Unless someone gives us a \$40,000 grant to abandon our jobs and work on this thing night and day until November, don't look for the Piaggio at this year's race. Also, if anyone knows of a clinic that treats "manic-aggressive" R/C pilots, let me know; I've got just the guy for them!

## FLOATING AROUND

(Continued from page 75)

ing dock) and to launch and retrieve them from the top of a sea wall. Alf and Roy built a traveling platform out of garage-door tracks and angle iron. With its engine idling, a plane is placed on the ramp and lowered into the water. For retrieval, they reverse the procedure. When an engine dies on the water, they have to climb into Alf Lea's handcrafted mahogany speedboat (which is powered by a restored flat-head Ford) and actually go out on the lake to retrieve the plane! Tell me something, Doug, does it ever get worse than this in Alberta?

Doug also tells us that the Ogoogo Fly-In at Lake Kalamalka in Central British Columbia was as well-attended as Clearlake, with high-caliber aircraft and superb flying. I've seen videos of float flies in Canada and Alaska, and I can tell you that these guys don't mess around. On



Bud Schwesinger sent this early morning pit shot of Oregon's Plat I Float Fly.

one tape, I counted a dozen scale twins and tri-motors! If anyone out there has photos of these great northern models, please send them to "Floating Around" so we can all take a look.

Bud Schwesinger was kind enough to send photos of the '90 Plat I—the largest float meet in Oregon. Bud also reports that Oregon's first female pilot was recently registered, but he didn't give me her name (you blew it, Bud!). At any rate, congrats-



Another fantastic float site! Fred Sanford sent this picture. Dwight Sandgren preps his O.S. 70 Surpass-powered "Miss Grandon" on Sanford's Dock, Lake Bemidji, MN.

tions to Bud and CD Bob Cambell for a great weekend at the beach!

Our final aquagram this month comes from Fred Sanford of Bemidji, MN. Fred has been flying R/C since the '60s and has enjoyed float flying from the start. His first plane was a Setco Navigator flying boat with rudder and motor control! Over the years, Fred has campaigned several flying boats, and he reports that, in 1990, his local AMA Club held its first sanctioned float fly, which was very well-received.

## CASH CRUNCH

Almost anyone will tell you that this "minor recession" we're experiencing has had its effect on disposable income (read: hobby money). In closing, I'll offer a suggestion to those of you who are watching your wallets. Dig out *MAN's* last special float issue (October '90) and make a quick set of foam floats out of scraps (using the table of dimensions we provided). Glass the floats with an old bedsheet and latex paint, and waterproof them with clear polyurethane. Next, strap your economy floats onto some plane you've lost interest in, and guess what? You have a new aircraft at little or no cost that can give you a summer full of fun! The October '91 issue will again be *MAN's* annual float issue. Tom Atwood will be up to his neck in "float stuff" for the first time! Don't miss it, and see you then! ■

## Robbe Catalog

A 496 page, full color presentation of over 130 airplanes, boats and cars with hundreds of accessories with 60 pages and over 25 helicopters including tools and accessories

## Schluter/Heim Catalog

presenting over 20 minutes of RC action.

Both catalogs and the video come with a \$4.00 refund coupon good toward your next purchase (\$50.00 minimum) direct from Robbe.

## The EXCITING R/C CATALOGS come most from



Robbe Model Sport, Inc.  
170 Township Line Road • Belle Mead, NJ 08502 • 1-908-359-2115

- ☐ Rush me Robbe's new '91 catalog with a \$4.00 refund coupon (4th class: \$8.50, 1st class \$11.00, Canada \$13.00 US)
- ☐ Rush me Schluter's new '91 catalog with a \$4.00 refund coupon (4th class \$5.00, 1st class \$6.00, Canada \$7.00 US)
- ☐ Rush me your New Items Video with a \$4.00 refund coupon (1st class \$14.95, Canada \$16.95 US)
- Enclosed is my ☐ check ☐ money order ☐ credit card

Name \_\_\_\_\_ Phone \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_

State \_\_\_\_\_

Zip \_\_\_\_\_

Visa/MasterCard No. \_\_\_\_\_

Exp. Date \_\_\_\_\_

Signature \_\_\_\_\_



# K&S For Tubing



Our carefully engineered line of metal products has unlimited uses in the development of all types of projects. All of your metal needs available in one place.

ALUMINUM TUBE (12")		
STOCK NO.	SIZE	PRICE EACH
100	1/16	.25
101	3/32	.30
102	1/8	.30
103	5/32	.35
104	3/16	.40
105	7/32	.45
106	1/4	.50
107	9/32	.55
ROUND BRASS TUBE (12")		
125	1/16	.35
126	3/32	.40
127	1/8	.40
128	5/32	.50
129	3/16	.55
130	7/32	.60
131	1/4	.65
132	9/32	.70
133	5/16	.80
134	11/32	.90
135	3/8	1.00
136	13/32	1.10
137	7/16	1.20
138	15/32	1.30
139	1/2	1.40
140	17/32	1.50
141	9/16	1.60
142	19/32	1.75
143	5/8	1.85
144	21/32	1.95
COPPER TUBE (12")		
117	1/16	.25
118	3/32	.30
119	5/32	.40
120	1/8	.35
SOFT BRASS FUEL TUBING (12")		
121	1/8	.50

RECTANGULAR BRASS TUBE (12")		
STOCK NO.	SIZE	PRICE EACH
262	3/32 x 3/16	1.30
264	1/8 x 1/4	1.40
266	5/32 x 5/16	1.60
268	3/16 x 3/8	1.85
BRASS STRIPS (12")		
230	.016 x 1/4	.25
231	.016 x 1/2	.35
232	.016 x 1	.50
233	.016 x 3/4	.45
234	.016 x 2	.95
235	.025 x 1/4	.30
236	.025 x 1/2	.50
237	.025 x 1	.90
238	.025 x 3/4	.65
239	.025 x 2	1.70
240	.032 x 1/4	.35
241	.032 x 1/2	.55
242	.032 x 1	.95
243	.032 x 3/4	.75
244	.032 x 2	1.90
245	.064 x 1/4	.70
246	.064 x 1/2	1.15
247	.064 x 3/4	1.40
248	.064 x 1	1.90
249	.064 x 2	3.40
SQUARE BRASS TUBE (12")		
149	1/6 Square	.65
150	3/32 Square	.80
151	1/8 Square	.90
152	5/32 Square	1.00
153	3/16 Square	1.10
154	7/32 Square	1.20
155	1/4 Square	1.40
BRASS STREAMLINE TUBE (12")		
122	Small	.90

SHEET METAL (4 x 10")		
STOCK NO.	SIZE	PRICE EACH
250	.005 Brass	1.00
251	.010 Brass	1.40
252	.015 Brass	1.90
253	.032 Brass	3.50
254	.008 Tin	.90
255	.016 Alum.	1.00
256	.032 Alum.	1.40
257	.064 Alum.	2.20
258	Asst Brass	2.40
259	.025 Copper	3.00
BRASS ANGLE (12")		
171	1/8 x 1/8	.55
172	5/32 x 5/32	.65
173	3/16 x 3/16	.55
174	7/32 x 7/32	.60
175	1/4 x 1/4	.65
BRASS CHANNEL (12")		
181	1/8	.70
182	5/32	.80
183	3/16	.65
184	7/32	.70
185	1/4	.75
SOLID BRASS ROD (12")		
159	.020	.10
160	1/32	.12
161	3/64	.15
162	1/16	.20
163	3/32	.25
164	1/8	.40
165	5/32	.60
166	3/16	.80
167	.114	.40
168	.081	.40
169	.072	.25

Send 25 cents for catalog and price list. K&S Engineering, 6917 W. 59th St., Chicago, Illinois 60638. Telephone: 312/ 586-8503.



## JR X-347

(Continued from page 66)

Mode, turn on the transmitter and depress the UP/DN mode buttons simultaneously. You can set-up all the basic systems (model select, model name, type-selection function, data reset, wing type, modulation selection and copy function) by scrolling up or down on the menu loop. To save the setup and return to the regular display, press the UP/DN buttons simultaneously.

Press the UP/DN buttons again to access the Function Mode where you again scroll through a menu loop. Now you can set up dual rates, exponential, servo-reversing, sub trims, end-point adjustment, mixing, fail-safe, timers, etc. These settings are easily accomplished by coordinating the function buttons with the LCD screen read-out. The initial settings are strictly starting points from which to fine-tune the model.

I only fly gliders and electric models, and I have several models that can use the airplane and glider configurations offered by the X-347. When I previously considered an electric helicopter, the radio requirements for optimum operation held me back—not anymore! Now I can fly any type of aircraft I want with *one* radio and store setups for four different models...truly a modeler's dream come true!

\*Here's the address of the company that's featured in this article:

JR Propo; distributed by Hobby Dynamics, P.O. Box 3726, Champaign, IL 61826.



**Custom R/C Graphics Inc.**  
**THE ORIGINAL**  
 as seen at the '90-'91 WRAM Show & the '91 Toledo Show

**Don't Be Fooled By Imitators**

- Scale Markings (all airplanes, cars, boats)
- Stars, Circles, Triangles, Club logos
- Pre-Spaced Letters & Numbers
- Many options to choose from
- 80 Colors to Select From
- Pin Stripe Tape, 2 mil thin
- Trim Sheets, line sheets 6" x 36"
- Wing Designs, create your own or we can
- Pin Line Tape, 48" long
- Stencil Tape
- 16 Type Faces to Select From

SEND \$3.00 FOR 37-PAGE CATALOG.  
 CUSTOM R/C GRAPHICS, 4138 Boston Rd.  
 Bronx, NY 10475 • 212-324-7858 phone/fax

### SCALE R/C AIRCRAFT PLANS

MESSERSCHMITT 110	twins	89"	42.00
HENSCHEL 129	twins	93"	42.00
LAVOCHKIN LA-7	Russian	81"	42.00
HEINKEL 51A	bipe	90"	34.00
AT-6/SNJ	1/6 scale	84"	27.00
NAKAJIMA Ki 84	FRANK	88"	42.00
HAWKER SEA FURY		86"	42.00
CURTIS R3C2	Racer floats	88"	48.00

Cowls, Canopies available Information \$1.00

- All built up wood construction
- All wings shown
- Plans shipped rolled
- Add for foreign postage

**DON SMITH**

2260 N. DIXIE HWY.  
 BOCA RATON, FL. 33431 407 395 9523



For TOP PERFORMING

**ENGINES**  
 AIRPLANE • MARINE



**K&B MFG. Inc.**  
 2100 COLLEGE DRIVE  
 LAKE HAVASU CITY, AZ 86403

## MAGIC

(Continued from page 41)

process, but they can be filled with a mixture of epoxy and microballoons, or with UFO.

For the hinges, I used 3M book tape, which is thin and stays flexible. I substituted control horns made of epoxy/glass plate for the plywood ones included in the kit. If you want to finish the wings, make sure you seal all the pinholes first; if you don't, the solvents in the paint might attack the foam. To be safe, use water-based acrylic enamels. To increase the plane's visibility, paint the bottoms of the wing tips, or apply trim sheets.

### PERFORMANCE

Nine days after starting the Magic, I was

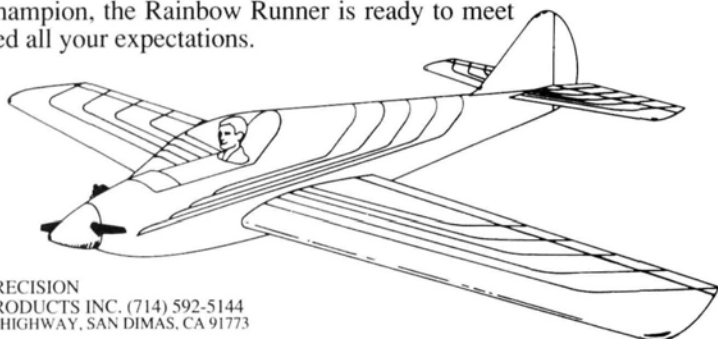
at the field. The first hand-launches covered a lot of ground, and things looked really good for the first flights. Unfortunately, there wasn't much lift that day, but glide looked fine. The following weekend, I visited the Millstone Valley Silent Fliers during their monthly club contest. The weather was cold, overcast and threatening rain. The Magic had no problem making the first two 7-minute max's and, with its lightweight and crow (ailerons up, flaps down), it was easy to hit the spot without any practice. In a drizzle, the final flight lasted only 5½ minutes, after a downwind launch with a tired winch battery—great for the conditions. On another day, the Magic's longest flight lasted over an hour.

The Magic is easy to launch. I drop the

(Continued on page 106)

## "RAINBOW RUNNER: PURE PERFORMANCE"

The Rainbow Runner delivers total pattern performance in .25 and .45 sizes. Designed with all the features of a pattern champion, the Rainbow Runner is ready to meet and exceed all your expectations.



**GM** PRECISION  
PRODUCTS INC. (714) 592-5144  
510 E. ARROW HIGHWAY, SAN DIMAS, CA 91773

## Hobby Lobby's CATALOG 17 is FREE! in the USA.

Hobby Lobby's Catalog 17  
has MORE items for the  
RC beginner;

there are MORE flyable  
airplanes for the RC beginner  
and the best beginner's  
RC aircraft and boats available.  
It has dozens of NEW items that  
have never been seen before  
in the USA:

NEW electric powered aircraft,  
NEW motors, NEW and  
innovative hardware;  
NEW sailboat, NEW RC sailplanes —  
dozens of NEW items!

Hobby Lobby's NEW Catalog 17  
is bigger — 120 pages  
most of them in color!

**Catalog 17 is FREE  
in the USA.**

**Just call (615) 373-1444  
or send the order form.  
Or, call for fast first class mail  
\$2.00 — bill to your credit card.  
Outside USA send \$5.00 for  
Airmail delivery (or charge  
to your credit card).**

MAN

Name

Street Address

City

State

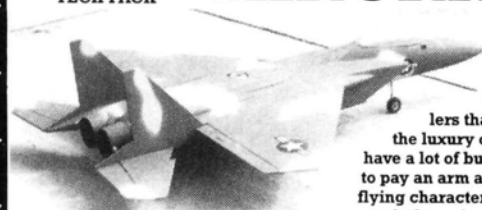
Zip

**HOBBOY LOBBY**  
INTERNATIONAL, INC.®

5614 Franklin Pike Circle  
Brentwood, TN 37027  
(615) 373-1444

## SPORT SCALE F15 BY **TOP GUN** AIRCRAFT

SEND \$5  
FOR  
TECH PACK



### "THE ULTRA EAGLE"

The Ultra Eagle's hand-laid fiberglass construction is lightweight, strong and forgiving. With its rugged construction and the landing gear mounted firmly in the fuselage, not in a delicate foam wing, the durability of this kit is unmatched on the market today.

COMBINE ALL THESE QUALITIES WITH A KIT THAT BUILDS FAST AND SIMPLE,  
AND YOU HAVE THE ULTIMATE KIT...

AVAILABLE AT THE INTRODUCTORY PRICE OF \$299<sup>00</sup>

Contact your local Dealer  
If he doesn't stock  
Top Gun kits order direct

**(815) 433-6132**  
VISA, MC or COD accepted

**TOP GUN AIRCRAFT 801 Canal St. Ottawa, IL 61350**

The Ultra Eagle is the Ultimate  
Ducted Fan Trainer designed with the  
Grass Field Flyer in mind. This extra-  
ordinary aircraft was designed for mod-  
elers that want to fly ducted fans, but don't have  
the luxury of a nice hard surface runway, who don't  
have a lot of building time and for those that don't want  
to pay an arm and a leg to get started. The Ultra Eagle's  
flying characteristics make it a perfect training aircraft  
and after a few flights even an experienced pilot could  
not ask for more.

Length: 67"  
Wingspan: 51"  
Weight: 10½  
Channels: 4/5  
Power: Byrojet



# ABOUT THOSE E N G I N E S

by JOE WAGNER

## Deisel-Ease?

**M**ODEL AIRPLANE engines have been made for so many years, by so many manufacturers and in so many configurations, that you'd think it would be impossible to come up with anything new. Yet

engines, but he has considerable practical experience. Since heat ignites a model "diesel" engine's fuel-air mixture, he thought that if he added a "heat reservoir" to a glow engine's combustion chamber, the engine could operate as a diesel does—without needing high compression. Lou tried it, and it worked! True, it wasn't perfect—he had to

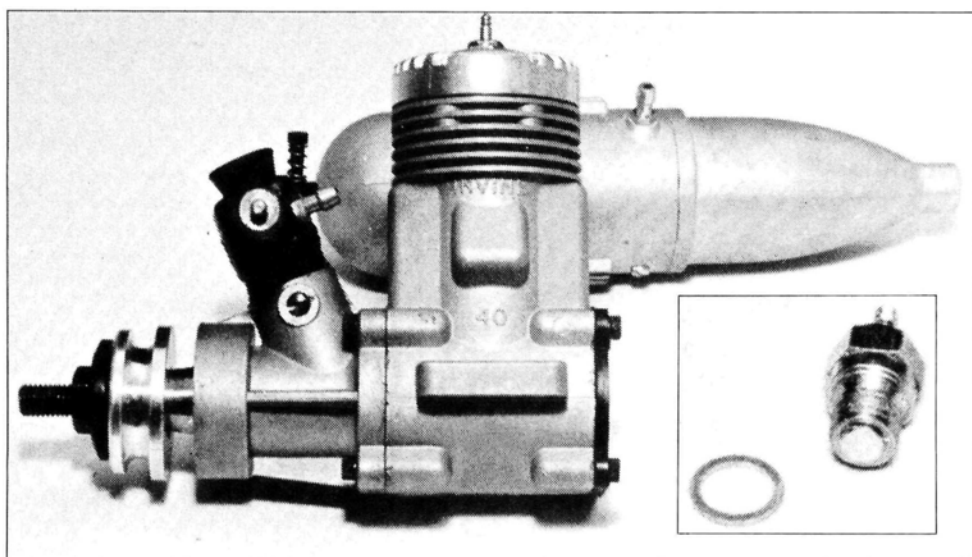
to do a lot of fiddling and adjusting of fuel formulas (I assume you do, too), so I decided not to report on the Gadget in this column.

Further research and correspondence between Lou and me, however, has educated both of us considerably, and a greatly improved version of Lou's product should be available soon. I also made the mistake of

for the reason he thought it did. His copper slug initiates combustion, all right, but not because it acts as a heat reservoir. Instead, it has a *catalytic* effect. I discussed the catalytic operation of glow plugs in a recent column, and I showed that it isn't the glow element's heat that ignites the fuel; it's the catalytic action of the platinum-alloy filament. (If it were just the wire's red heat that did the job, nichrome or tungsten would work just as well as platinum, but neither of them do.)

Copper is a catalyst, too! Its action isn't nearly as powerful as platinum's, nor does it catalyze as many substances. Copper definitely *does*, however, catalytically promote the reaction of the organic peroxide compounds that result from the decomposition of ether when it's been exposed to hot air. *That's* what really makes Lou's Gadget capable of turning a glow engine into a "diesel" engine. Now that we know *why* Lou's Gadget works, a greatly improved version that takes advantage of this knowledge is on the way!

*\*Here are the addresses that are pertinent to this article:*  
**Louis Furco**, 719 Third St., W. Babylon, NY 11704.  
**George Genevro**, 2050 Christina St. NW, Salem, OR 97304.  
**Roger Schroeder**, 4111 W. 98th St., Overland Park, KS 66207.  
**Coles Power Models**, P.O. Box 788, Ventura, CA 93001.  
**Grizzly Imports Inc.**, P.O. Box 2069, Bellingham, WA 98227.



● Inset: It's so simple that it's hard to believe it really works! Louis Furco's Gadget is just a copper slug that's installed in a glow body. ● The early Gadgets work best in glow engines that are larger than .20. This British Irvine Sport .40 has a higher compression than usual, so the Gadget works well in it.

Louis Furco\*, an old-time modeler from Long Island, NY, seems to have developed what he calls the "Gadget." It allows unmodified glow engines to run on "diesel" fuel, and it consists only of a glow-plug body with a copper slug in it instead of the usual platinum wire-heating element.

Lou doesn't have any formal education in the design of internal-combustion

vary the fuel formula for different conditions, and it didn't work in *all* glow motors—but it *did* function.

Lou sent me one of his Gadgets last summer, and I tried it in an Enya .15 that I had handy. Although I eventually managed to get one good run out of the "dieselized" Enya, it wasn't easy. I like my engines to start quickly and perform reliably in a wide variety of conditions without having

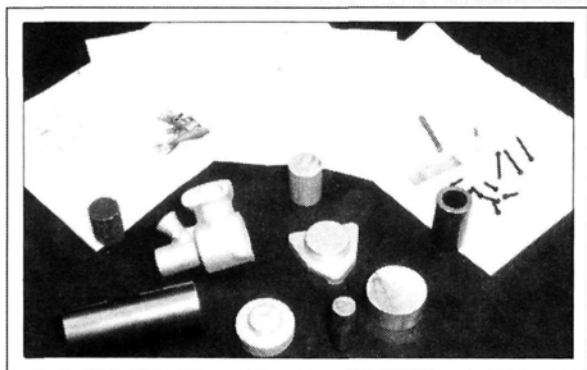
testing the Gadget in an engine that was too small. Lou's instruction sheet plainly states that his setup works best with *big* motors. I put the Gadget in a .15 anyway, because I prefer to use small engines for my R/C flying, and I couldn't see why motor displacement would affect the Gadget's operation.

Lou also made a mistake. Although his Gadget worked, it didn't work for

# Q&A SECTION

I always appreciate readers' input, and I respond to every letter I receive (please include a SASE, though). I do my very best to answer all the questions thoroughly and accurately—even if it takes several pages. Sometimes, the questions are of general interest and can be answered briefly; I'll respond to such queries in this "Question and Answer" (Q&A) section. I'd like to hear from you! Of course, I'll still respond to every letter personally, but I'll also condense and publish some of the questions and my answers here.

**T**his month, four readers wrote with a variety of inquiries about homemade model engines. Bernie Canlas of the Philippines, Bruce Carlisle from Saudi Arabia (one of our Desert Storm troops), Don Belote of Toledo, OH, and Mel Lands of Isle of Palms, SC, are all interested in do-it-yourself (DIY) model-engine projects. Here's a combined, condensed version of my replies to these inquiries.

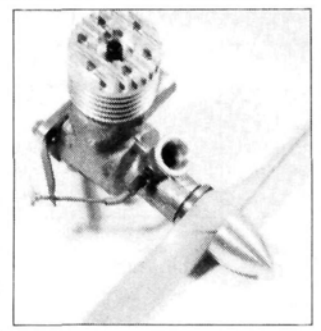


George Genevro's Titan .60 is the most complete do-it-yourself engine kit I've ever seen. It includes all the necessary bar-stock material, castings and drawings.

There are two basic types of DIY model engines. One type uses metal castings for the crankcase (and sometimes a few other parts, too). The other type is machined entirely from solid bar stock. (MAN published drawings and instructions for two engines of this kind a few decades ago. AMA Museum curator Hurst Bowers says that the Museum can readily furnish copies of the original articles.)

Several of the DIY model motors that have castings are available as kits, and one is available from George Genevro\*. This complete kit contains all the necessary drawings and most of the materials to construct George's Titan .60 engine—all except the needle-valve assembly and the glow plug. (You can use a "replacement" needle valve from a commercial engine, or an R/C carb of the appropriate size.)

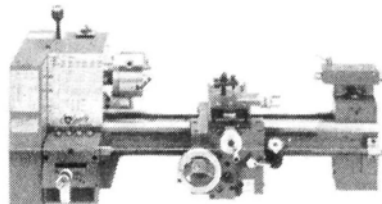
Roger Schroeder\* is another source of DIY engine kits. He offers seven projects, including a compressed-air engine, four replicas of antique spark-ignition engines and a unique .04 twin-cylinder



The completed Titan .60 is well worth the many hours of patient, skilled work that it takes to convert the castings and bar stock into a finished powerplant.

## 8" x 18" LATHE

QUICK-CHANGE JEAR BOX!



You can't machine your own engine without an engine lathe. This one (imported by Grizzly) is suitable for many types of model projects.

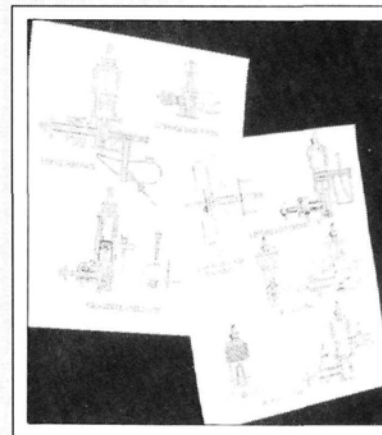
glow model that's made largely with stock Cox engine parts.

Still another DIY-engine kit supplier is Coles Power Models\*. This company has been in business for a very long time, and its fully illustrated catalogue costs \$4. (It's worth it.)

Kit availability was the good news; now for the bad news! All the projects I've mentioned require time, a high degree of skill, accurate measuring instruments (e.g., micrometers, depth and "telescope" gauges, a machinist's scale, a square, a protractor, etc.) and precision machine tools. At the very least, you need a metal-cutting lathe and a quality drill press. If you don't have a milling machine, you can use a milling

attachment on your lathe, but it isn't as convenient and takes much longer to set up.

When you build your own model engine, setting up is what takes the most time. Even if you have to make only one conrod, you still have to set-up the tooling as if you were going to produce hundreds of parts, and you usually have to make separate setups for



Roger Schroeder offers seven engine kits that include a variety of engines. These cross-sectional views show Roger's lineup.

every operation. If you're not used to metal-working procedures, it could take you a whole weekend just to machine one bar-stock-aluminum conrod.

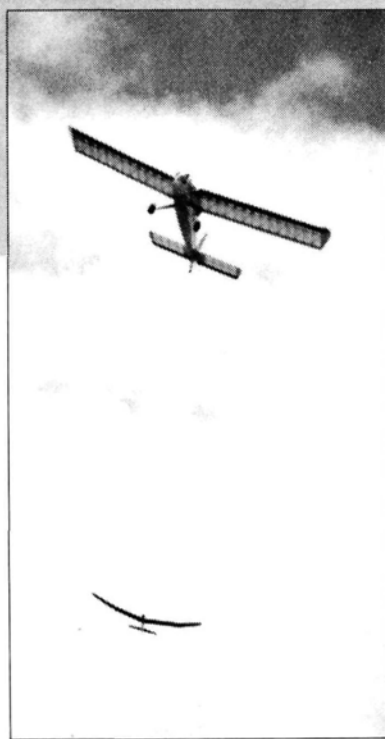
Now for some more good news. Although low-cost, home-workshop metal lathes have been in extremely short supply in the U.S. for years, Grizzly Imports\* now offers a Taiwanese lathe that's ideal for model-engine work. Its size, power and included accessories make it the best bargain in metal-cutting machine tools that I've come across in quite a while.



*Towing another plane isn't as easy as it seems. Turns must be gradual and air speed constant. The trick is to keep the towline taut at all times.*

# Hooked on towing

by DAVE HERBERT



*A front view of the Telemaster towing a sailplane.*

Know  
how  
to  
tow

**I**F YOU'VE read any of my past articles, then you know that the Capistrano Aero-Dumpmaster Special Effects Team—led by yours truly—doesn't follow the norm. If someone says that something can't be done, we usually take on the challenge. We fly as a team, and as senior pilot, I must thank my ground crew. They work in harmony, and because of this, we pull off some amazing stuff. I could tell you some interesting tales....

Our latest summer venture is using R/C gas-powered planes to tow R/C sailplanes. One of our senior members, Lyle Maxey, is a world-class pilot of full-size sailplanes. (He won the 1956 National Soaring Championships.) When he suggested that we try an R/C

towline setup, we all looked at each other and smiled—the challenge began. We had never seen this done or even read about it. I thought about whether I had a plane in my arsenal that would make a good tow-plane, and my old, trusty, Lou Andrews Aeromaster biplane seemed to fit the bill. Dave Raubinger provided a sailplane, and he installed a servo with a towline release in its nose.

## IMPORTANT TIPS

Lyle said that the most important thing the pilot of a full-size tow-plane has to keep in mind is that, "the tow-plane must maintain a constant air speed." This isn't as easy as it sounds. A tow-plane speeds up when it reaches a thermal, and when the sailplane hits the same thermal, it speeds up, too. Trying to keep the towline taut is difficult. When the line slackens and then tightens abruptly, the situation can get really hairy. (The slack is difficult to see when you're standing on the ground!) Lyle also told us that the sailplane must maintain the same altitude as the tow-plane, or fly just below its wash. (This is also difficult to see from the ground.)

Full-size towlines are usually between 200 and 300 feet long, and their braided construction allows them to stretch and absorb slack. A full-size sailplane pilot's worst fear is that the towline will be released during takeoff, before he has enough altitude to turn around and get back safely to the field.

## MODEL MISHAPS

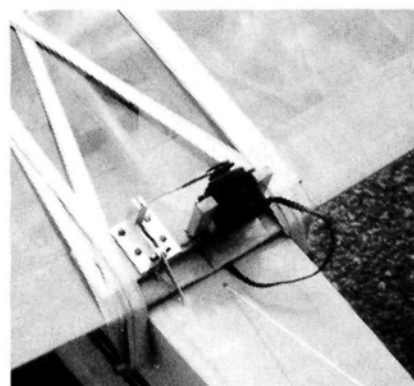
For the towline, we settled on a 75-foot length of braided-nylon cord. To increase elasticity, we attached a 2-foot-long heavy rubber band to the cord, close to the tow-plane. Then

PHOTOS BY BOB BRUCKER & DAVE HERBERT

# Hooked on towing

we mounted the towline to the tail wheel (as is done on the full-size versions), and we were ready for the first attempt.

A major difference between our R/C setup and a full-size setup became apparent during the takeoff run. Solving the problem was a frantic "yelling" experience. The sailplane lifted off almost immediately, and it was 5 feet higher than the Aeromaster. I finally got the biplane off the ground, but it had difficulties climbing, and when I thought the tough part was over, my biplane began to fly downward—full-up didn't help! Just before the biplane was in danger of crashing, Dave detached the towline from the sailplane, and I recovered the tow-plane. We had learned our first lesson: the towline *must* be attached to the top of the tow-plane's fuselage, close to its center of gravity. This way, if the sailplane flies above the tow-plane, it doesn't force the tow-plane into a dive by pulling its tail up. I attached the



Here, the release mechanism is held in place with the wing hold-down rubber bands. It works every time!

line to the Aeromaster's left rubber-band dowel, and this solved the problem.

The second takeoff was uneventful, and all seemed well until the first left-hand turn.

This is when we discovered that it's best for the sailplane to follow the outside

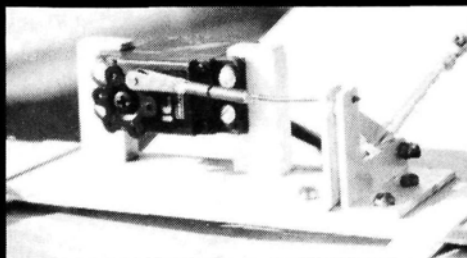
of a turn, just below the tow-plane. I made a left turn that was too sharp, and this caused the line to slacken. When it tightened, Dave's sailplane did three snap rolls while still attached to the tow-plane. We both hung on, and it was quite a thrill!

It's important not to make any sudden moves. The tow-plane pilot must pull steadily. To make turns that are similar to those made by the full-size planes, I used most of my biplane's rudder. I also had to be careful not to

snap-roll the tow-plane (Aeromasters snap easily). This can happen while towing, because you use so much rudder and elevator.

When the planes reached an altitude where I could no

(Continued on page 114)



◀ Left: this simple release mechanism works smoothly, and you probably have all the parts to make it in your workshop. ▼ Below: You can use wooden posts or a plastic servo mount to attach the servo to the plywood base.

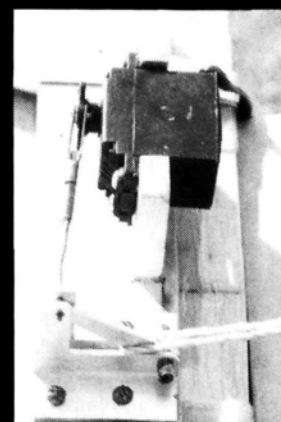
## The Release Mechanism

This release mechanism works smoothly and minimizes the load on the servo. It consists of:

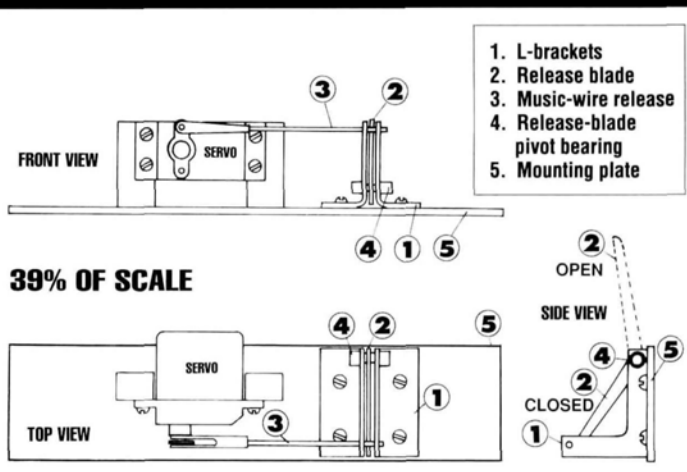
- two 1/16-inch aluminum L-brackets (1)
- a 1/16-inch aluminum release blade (2)
- a music-wire release (3)
- a release-blade pivot bearing made of 1/8-inch brass tube (4)
- a 1/8-inch plywood mounting plate (5)

To prevent the pivot bearing from slipping, solder small lengths of slightly larger tube onto the ends of the 1/8-inch tube. Mount the L-brackets onto the plywood mount with four small wood screws, and attach the release pin to the servo output arm with a clevis or a wire Z-bend. To attach the servo to the plywood base, use two wooden posts or a plastic servo mount.

Use the wing's hold-down rubber bands to secure the mounting plate to the plane, or drill the plate to accept the wing's nylon hold-down bolts (if so equipped). To make the setup more realistic, install a similar release mechanism in the sailplane's nose. First, detach the towline from the sailplane. Then, on a low flyby, detach the towline from the tow-plane so that you can land it safely—without dragging the line behind it.



Dave Raubinger (left) with his scratch-built sailplane and Dave Herbert (right) with the Telemaster they use for towing.





# HELICOPTER SECTION

## C O N T E N T S



**93 Kyosho Concept 30 SX**

*by Dave Herbert  
A Pad & Bench Review*

**98 Rotary-Wing Roundup**

**101 Helicopter Challenge**

*by Craig Hath*

**104 Helis at Toledo '91**

*by Jerry Hicks*

*This month, don't miss Dave Herbert's "Pad & Bench Review" of the Kyosho Concept 30 SX—an upgraded model for demanding fliers. In "Helicopter Challenge," Craig Hath continues his discussion of aerobatic maneuvers, including the Immelmann turn, the split-S, the Cuban-8 and the rolling stall turn. Finally, Jerry Hicks gives an overview of the products that were displayed at the Toledo show.*

*The photograph on this page shows the SH-2F Seasprite LAMPS 1 helicopter equipped for anti-submarine warfare. (Photo courtesy of Publications International Ltd.)*



K  
Y  
O  
S  
H  
O

# CONCEPT 30

by DAVE HERBERT

IF YOU'RE a novice R/C helicopter enthusiast, Kyosho's\* Concept 30 DX is a good heli with which to start. If, however, you're a newcomer who feels confident about becoming a "high-time" flier, then start with Kyosho's improved version of the 30 DX—the Concept 30 SX. It's definitely worth the extra money! How do you determine which helicopter is best for you? Well, if you can really hold your own in the "Asteroids" video game, then go for the SX. If not, start with the DX!

*SX*



PHOTOS BY CHARLES LACROIX



THE  
BEST  
JUST  
GOT  
BETTER



## DX DILEMMAS!

I've had a lot of experience with .40-size helicopters, and I've always had confidence in my Concept 30 DX. It's a very good helicopter for beginners because it's easy to repair, and replacement parts for it are readily available.

I fly eight to 12 times during a session, so I soon discovered that this machine needed some improvements (i.e., some of its parts wore excessively). To make my 30 DX more aerobatic, I added Kyosho's SE-version upgrades (e.g., ball bearings at all rotational points), but I still found that many of the parts wore out relatively quickly. I had problems with the ball linkages, the control rod and the rotor blades, and these led to further complications.

## ENTER THE SX

In the Concept SX 30, Kyosho has addressed most of the problems by either "beefing-up" or redesigning the weak parts. The instructions are good: the shaded drawings are easy to understand, the pictures are fabulous, and construction is straightforward. The parts come in neat bags, and that makes it easy to find them during construction. Kyosho also includes a replacement-parts price list (which I really appreciate!) and an ad-



# CONCEPT 30

dendum that explains all the SX upgrades.

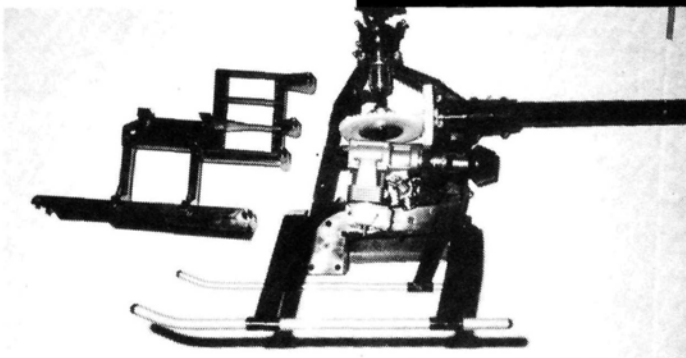
The main improvements include:

- Drawings of screws and metric rulers on every page of the manual. This makes building a pleasure.
- Wooden, weighted blades replace the 30 DX's plastic ones. They're very aerodynamic, strong and more stable. (They sound great, too!) In future SX kits, improved plastic blades will be standard.
- The main rotor head has thrust bearings for trouble-free blade tracking and smooth pitch changes.
- The swashplate has stainless-steel balls to reduce control slop. (I'd like to see them used at every point, though.)
- An aluminum mixing base allows for precise control transfer from the swashplate to the rotor head.
- Shorter pitch arms slightly increase the collective-pitch range.

- An all-metal fore/aft-cyclic seesaw reduces wear and provides more precise control.
- All the controls have ball-type linkages for slop-free control.
- The swashplate

control, mast control and main-rotor-head control come completely assembled.

- A full set (34) of precision ball bearings reduces friction.
- Larger, lightweight flybar paddles improve the cyclic response.
- A ball-raced, brass-lined clutch reduces wear and increases heat dissipation.
- Stiffer tail-rotor blades increase tail-rotor control.



*In this picture of the main body frame, you can see the Super Tigre G-34H engine in place. Notice the large cooling fins on its head. The modular construction provides easy access for maintenance or repairs.*

## A FEW POINTS TO PONDER

Kyosho still hasn't made provisions for attaching a larger servo output arm to the collective-pitch servo. This isn't a problem unless your helicopter radio has throttle holds, etc. The collective-pitch channel and servo on my Futaba\* radio seem to lose their maximum

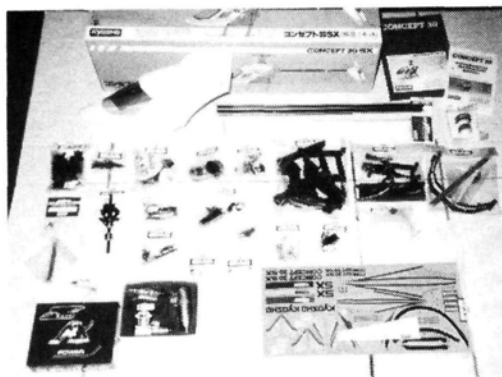
## SPECIFICATIONS

**Type:** Pod and boom helicopter  
**Rotor Diameter:** 45.7 inches  
**Length:** 39.8 inches  
**Weight:** 5.5 pounds  
**Power Req'd:** .32 to .35 2-stroke engine

**No. of Channels Req'd:** 5 (throttle, tail rotor, pitch, roll and collective pitch)

**Sug. Retail Price:** \$519.95

**Features:** the Concept 30 SX's modular construction makes maintenance and repairs much easier to do. The nylon-filled, injected-molded plastic parts are durable, and all come appropriately bagged, so it's easy to find parts during construction. The tail rotor is driven with a drive wire, and the plastic bevel gears will probably be very durable. The use of ball-link connectors avoids control-linkage slop.



*The SX's parts come in neat bags, and that makes it easy to find everything during construction.*

**Comments:** The Concept 30 SX's instructions are very good, and it took me about two evenings to assemble it. My only complaint concerns the collective-pitch servo's position. In the stock setup, only a small output wheel can clear the servo, and this reduces your collective throw. I use the throttle hold on my Futaba FP7 FG series FM radio for inverted and aerobatic flying. The model flies very well, and it performs rolls and loops as smoothly as a fixed-wing model.

# CONCEPT 30

throw capabilities during mixing, and a larger servo arm would solve this.

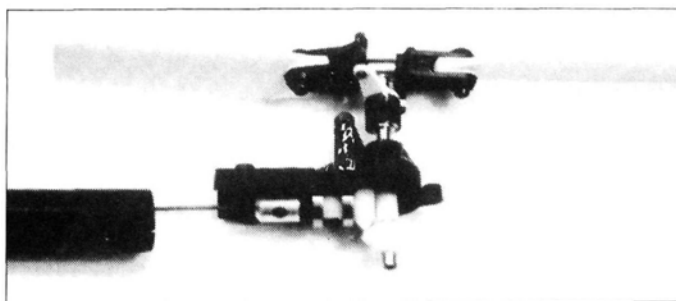
The pitch-servo-wheel drawings in the manual and the addendum are incorrect. They show the collective-pitch servo's output wheel



Here's the Super Tigre G-34H engine with the fan and starting cone in place. Notice the exhaust extension.

rubbing against or running (mysteriously) inside the elevator-cyclic-pitch servo (fore and aft)! When you install the ball connector, you'll find it impossible to run the output wheel as shown. To decrease the pitch throw, you'll have to use a smaller wheel or move the servos. You could also mount the two servos with long screws on "standoffs" made of large wheel collars. This setup will enable you to position the servos farther apart so that you can use a larger wheel on the collective-pitch servo.

The SX's short, blade-holder pitch arms increase the pitch throw slightly, but not enough for the heli to fly inverted without having to adjust the pitch trim for negative pitch. You have to make this adjustment after the heli is inverted and then



Here are the tail rotor and the gearbox. Notice the wire drive and the plastic bevel gears. The stiff blades improve tail-rotor control.

readjust the pitch when you roll out of the maneuver. (I'm busy enough during maneuvers!) The use of standoff spacers and screws would easily solve this problem, and they should be included in the kit. I'm sure Kyosho is working on this. (A computer radio that will increase the servo throw would also work.) Also, it's easier to find a place to mount the radio on/off switch after you've mounted the canopy to the heli's frame.

I don't have to worry about finding a place to

mount a gyro amplifier and its switch because I use a frictionless, all-in-one, Quest\* gyro. It's larger and more dependable, and you can adjust its sensitivity with the transmitter.

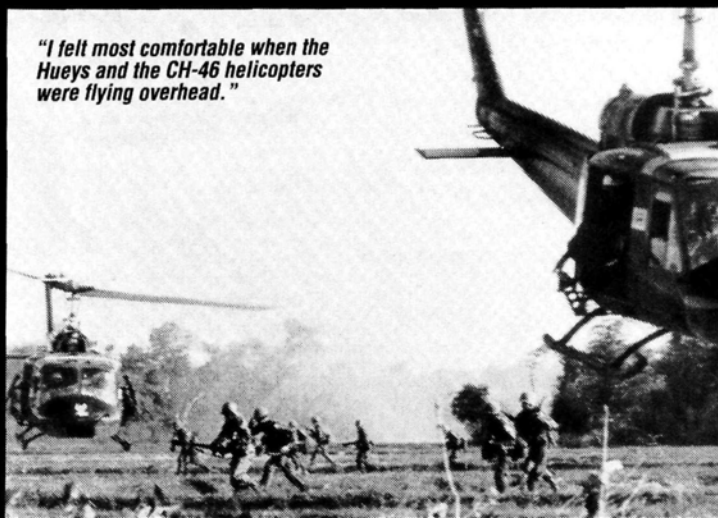
## FLYING HIGH

How does the Kyosho Concept 30 SX fly?—precisely and smoothly. When I flew my earlier .40-size helicopters, I had to worry about the possibility of damage caused by worn parts, and I couldn't have as much fun. With the SX, however, ev-

I guess I became addicted to helicopters while I was stationed in DaNang, Vietnam, in 1969. I was responsible for maintaining the avionics (electrical instruments in a plane's cockpit) on USMC RF4B Phantom II jets, and since DaNang was an air base for Air Force and Marine Air groups, we were frequently under rocket attack. I felt most comfortable when the Hueys and the CH-46 helis were flying overhead. The continuous tracer fire from their 50-caliber machine guns meant that we were being protected from ground attacks. Whenever they stopped flying or went out past the perimeter, I worried. The drone of blades beating the air was a symbol of safety. It became music to my ears; it was my life line.

While I was in Vietnam, I had a U-control model airplane. I couldn't get replacement parts for it, so I was careful not to crash it; modeling was a great escape. After getting out of the

"I felt most comfortable when the Hueys and the CH-46 helicopters were flying overhead."



## A HELI HISTORY

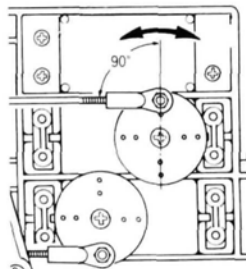
Marine Corps, I went into business for myself and continued in the model airplane hobby. I became interested in R/C helis while working with John Simone on the movie, "Blue Thunder." We were flying the R/C F-16s, and John was also perfecting his helicopter loops. He taught me to fly helis, and after I had learned how to fly them, I gained even more respect for heli pilots.

In the early days, R/C helis weren't very reliable, and you couldn't always determine whether the problems were caused by mechanical failures or by the pilot. I learned on a .40 American R/C Mantis,

and I seemed to be able to fly it fairly well, but I had problems with it. I've flown many R/C helicopters since then, and, of course, I've improved my flying skills. When I fly the reliable Kyosho Concept 30 SX, however, I feel safe again; as if I'm back on my life line.



everything works well, and the wear has been virtually eliminated. If there's ever a problem, though, the SX's modular construction will make repairs (or maintenance) easy to do.



In this illustration, the collective-pitch servo's output wheel (center) runs into the upper servo. A smaller servo output arm will fit, but it will reduce the collective throw.

never failed me, its power doesn't come close to that of the ST G-34H. I added a Kyosho pull-starter (remember to keep it oiled!), and I use my trusty Futaba radio. Now I find myself watching the model fly rather than spending all my time trying to sort out problems. The Kyosho Concept 30 SX is perfect for anyone who wants a high-performance helicopter without a lot of hassles.

\*Here are the addresses of the companies mentioned in this article:

**Kyosho**; distributed by Great Planes Model Distributors, P.O. Box 4021, Champaign, IL 61824.  
**Futaba Corp. of America**, 4 Studebaker, Irvine, CA 92718.  
**Quest**; manufactured by Century Systems, England; imported by C&R Hobby Distributors, P.O. Box 868, El Toro, CA 92630.  
**O.S.**; distributed by Great Planes Model Distributors.  
**Super Tigre**; distributed by Great Planes Model Distributors. ■

Instead of my old, reliable O.S.\* .28, I use a larger Super Tigre\* G-34H, which makes this helicopter capable of looping and rolling extremely well; in fact, it flies almost as well as some of my fixed-wing aircraft! Although my .28 has

## INNOVATIVE MODEL PRODUCTS

PRESENTS THE NORTH AMERICAN P-51D MUSTANG



MODEL BUILT BY HI-TEC MODELS BOB MELE

TO ORDER SEND CHECK OR MONEY ORDER TO :

INNOVATIVE MODEL PRODUCTS INC.

P. O. BOX 4365, MARGATE, FL 33063 OR CALL 800-780-3190

MODEL SPECIFICATIONS: SPAN 76.25 IN

WEIGHT 15 LBS ENGINE 1.08 2CY 1.20 4CY

MASTER CARD & VISA ACCEPTED  
 ADD \$20.00 SHIPPING AND HANDLING.

PRICE

\$299.95

### KIT FEATURES

- \* FLEXI-GLASS FUSE
- \* MACHINE CUT WINGS
- \* MACHINE CUT STABS
- \* ALL BUMPS & BLISTERS
- \* 5 VIEWS & PLANS
- \* CLEAR INSTRUCTIONS
- \* GENEROUS HARDWARE PKG
- \* CARBON FIBRE SPARS
- \* ALL VACUFORMED PARTS
- \* CLEAR CANOPY
- \* RETRACT LOCATION SHOWN

### ACCESSORIES AVAILABLE

- \* STATIC & FLYING SPINNER / PROPS
- \* FULL COCKPIT KIT
- \* BOMBS, TANKS, PILOT
- \* RETRACTS & STRUTS

MADE IN THE U.S.A.

## ★ BEARINGS

FOR R/C CARS, HELICOPTERS & ENGINES

NOW AVAILABLE: ENGINE BEARINGS  
 ONE OF THE LARGEST STOCKS OF  
 MINIATURE BEARINGS FOR ALL R/C  
 CARS, HELICOPTERS & ENGINES



WE ARE BEARING SPECIALISTS.

CALL OR WRITE FOR BEST PRICES, OR SEND \$3.00 FOR BEARING GUIDE FOR MODELS & ENGINES.

PHONE: (407) 998-0004  
 FAX: (407) 998-0119



BOCA BEARING CO.

7040 W. PALMETTO PARK RD.  
 SUITE 2304C  
 BOCA RATON, FL 33433

NORTH AMERICA TOLL-FREE  
 1-800-332-3256 (U.S.) • 1-800-553-3256 (CANADA)

FOR ADVERTISING INFORMATION ON THE  
 MOST WIDELY READ HELICOPTER  
 SECTION IN THE R/C INDUSTRY,  
 CALL JASON OR JULIA (203) 834-2900

### GULFWAR HELICOPTERS

- 60 Engine Size Epoxy Fiberglass Fuselage Kit
- Super Light weight Construction. Made in U.S.A.
- No Advanced Modeling Skills Necessary to Build.
- Accepts X-Cell, Kalt, Hirobo, GMP & Schluter
- Kit includes Bodys, Clear Canopy, Landing Gear, Flexible Tail Drive Unit, Wood, Hardware, Manual, Blueprint, some models also include Pilotstation, Machine Gun, Rocket, Radar Dome & Shocks.



**CENTURY**  
 IMPORT & EXPORT

WORLD CLASS R/C  
 HELICOPTERS & ACCESSORIES

759 E. BROKAW RD. • SAN JOSE, CA 95112

### IN STOCK!

- AH-1S TOW COBRA ..... 369.95
- AH-64 APACHE ..... 389.95
- UH-1B HUEY ..... 279.95
- UH-60A BLACK HAWK ..... 369.95
- WESTLAND SEAKING ..... 349.95
- NEW AIRWOLF (w/Retracts) ... 289.95

HOBBY DEALERS & HOBBIES  
 CALL OR WRITE for CATALOG

TEL & FAX (408) 436-1325

# ROTARY-WING ROUNDUP



## ROBBE Scout 60 II

Robbe's new Scout—the 60 II—has a larger rotor (59.60 inches) and a longer tail boom, a new Magic 60 tail-boom sup-

port, a Magic 60 tail-rotor pitch-change mechanism and aluminum bearing blocks. The Scout 60 II's mixing levers have been

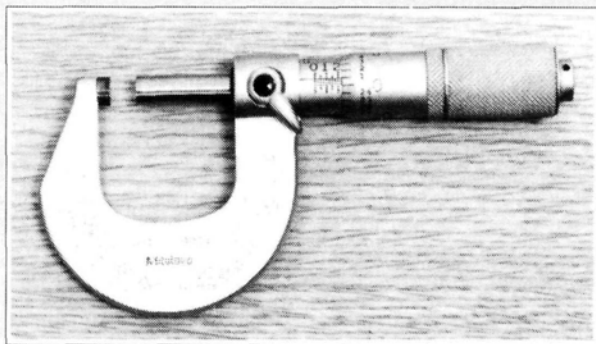
modified to improve its handling and increase its stability at lower rotor speeds. Its plastic servo structure makes construction quick and easy.

Part no. S2871

For more information, contact Robbe Model Sport, 180 Township Line Rd., Belle Mead, NJ 08502.

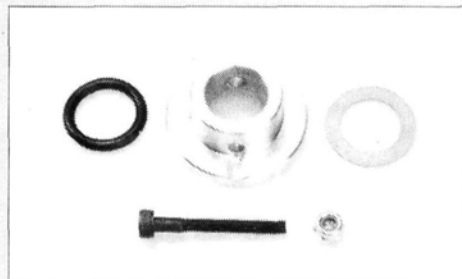
## MITUTOYO Slim Micrometers

Mitutoyo introduces its new, small, light Slim Micrometers (Series 202). They have a specially crafted slim "thimble" design with a .61-inch diameter (most micrometers have a .73-inch diameter). This gives you a better "feel" for a part, and your measurements will be



more accurate. There are two Slim Micrometers: the direct-feel friction type (commonly used by master machinists) and the ratchet type, which is used for repetitive work.

For more information, contact Mitutoyo/MTI National Headquarters, 18 Essex Rd., Paramus, NJ 07652.



## ALTECH SE Autorotation Tail Drive Assembly

Altech Marketing's SE autorotation clutch for the Shuttle permits tail control during power-off landings (e.g., the FAI 180-degree autorotation landing). Power is diverted to the tail rotor, so the blades lose their inertia more quickly. Because of the quicker power losses during autorotations, this option is for experienced pilots, though some intermediate fliers might find it helpful for landing in wind. This clutch can be adjusted by adding (or removing) washers to it to obtain the best "feel."

Part no. 0402-231

For more information, contact Altech Marketing, P.O. Box 391, Edison, NJ 08818.



## A SPECIAL MESSAGE TO RETAILERS

IMAGINE the benefits of drawing many more regular customers into your store every month. Imagine adding a popular, **profitable**—and returnable—hobby product to your store. By stocking **Model Airplane News**, **Radio Control Car Action**, the **Radio Control Action Series** and **Radio Control Boat Modeler**, you'll accomplish both! These are the most informative and entertaining modeling magazines available to the R/C consumer—and they're in tremendous demand. These magazines will actually stimulate more sales of R/C airplanes, cars, boats and accessories for you.

If you aren't already stocking Air Age magazines, please call us toll-free, and we'll let you know how they can make money for you.

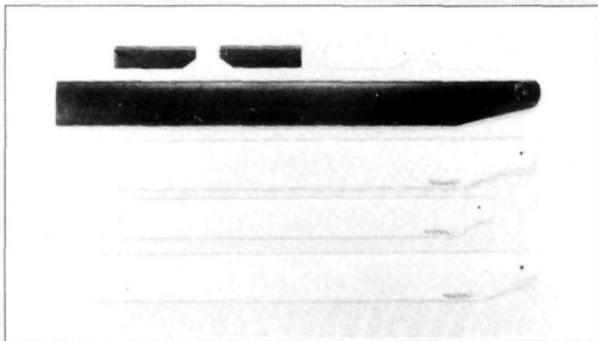


Call Tracey Schelmetic Toll-Free at  
**1-800-243-6685**

(in CT, 203-834-2900)  
(dealer inquiries only)

**Air Age Publishing**  
251 Danbury Rd., Wilton, CT 06897

### MINIATURE AIRCRAFT Rotor Blades



Miniature Aircraft offers a variety of laminated rotor blades that are strong, durable and light. Each resin-impregnated rotor blade has a "seven-laminate," "impreg" leading edge; imported "Romin" hardwood center; and a contest balsa trailing edge for optimum CG. If you want to add weight, lead powder is provided. Rotorsport Pro-Kevlar rotor blades come in reflex, tapered, or symmetrical styles (185 to 195 grams), and they're designed for damped rotor systems. They're available for the X-

Cell .60, Heim, Champion and GMP, Schluter Long Ranger/Magic and Kyosho Concept machines

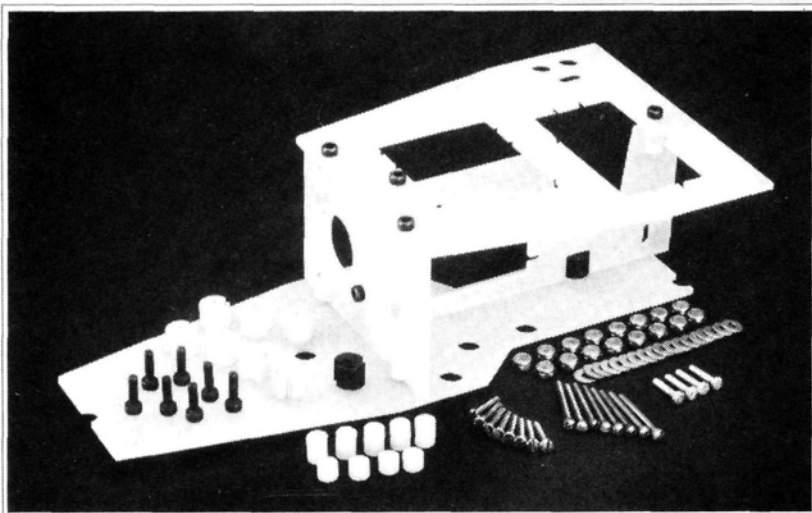
Part nos. 3670 (Resin for X-Cell .30/.40); 3672 (Resin for X-Cell .60); 3682-1 to 3687-1 (Pro-Kevlar for models listed).

Prices: \$39.95; \$42.95; \$119.95 to 139.95 (Pro-Kevlar).

For more information, contact Miniature Aircraft USA, 2324 N. Orange Blossom Trail, Orlando, FL 32804.

### HEL-X CORP. X-Cell Servo Trays

Tough, reliable and easy to assemble (no gluing), Hel-X's unbreakable servo trays come with instructions, all the necessary assembly and servo-mounting hardware and a "we'll replace-it-if-you-break-it" guarantee.



Part nos. A1001 (for X-Cell 50/60 size); A1006 (for X-Cell 30/40).

For more information, contact Hel-X Corp., 558 Highland Ave., Upper Montclair, NJ 07043.

# Helicopter Challenge

by CRAIG HATH

## Aerobatics that combine maneuvers

**H**AVE SOME really great news! Your favorite helicopter columnist has taken the plunge into becoming an entrepreneur! Yes, my wife Lori and I have started a new hobby business—Discount Radio Control Models—in our home city of Las Vegas, NV. If you're in town, stop by and see us.

### R/C AEROCHOPPER

Did you miss Bill Griggs's great review of Ambrosia Microcomputer Products'\* R/C Aerochopper system? If so, grab the May '91 issue and check it out. I have the Commodore Amiga version, and—wow!—I never knew I was such a great "stick"!

I'm having fun with the Aerochopper program, but I'm also comparing its usefulness as a training aid with that of a full-blown flight-training syllabus. I plan to compare the progress of two new fliers who start learning at the same time. One will use conventional training gear (i.e., whiffle balls and

dowels tied to the landing gear); the other will use the Aerochopper, the Whiteman flight simulator and the RotoPod. The winner will be the one who first learns to hover a heli through a full tank of fuel and complete a full forward-flight circuit. Look for more about this project in future issues.

### BASIC AEROBATICS CONTINUED

For the past few months, I've been discussing basic aerobatic maneuvers, including the stall turn, the

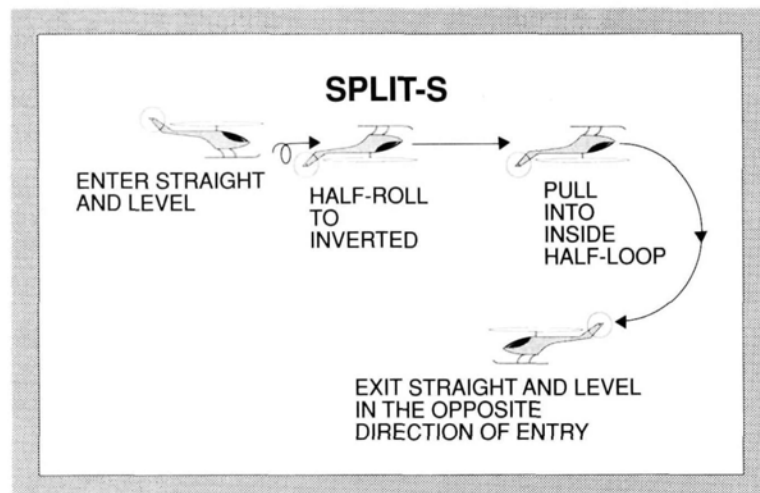
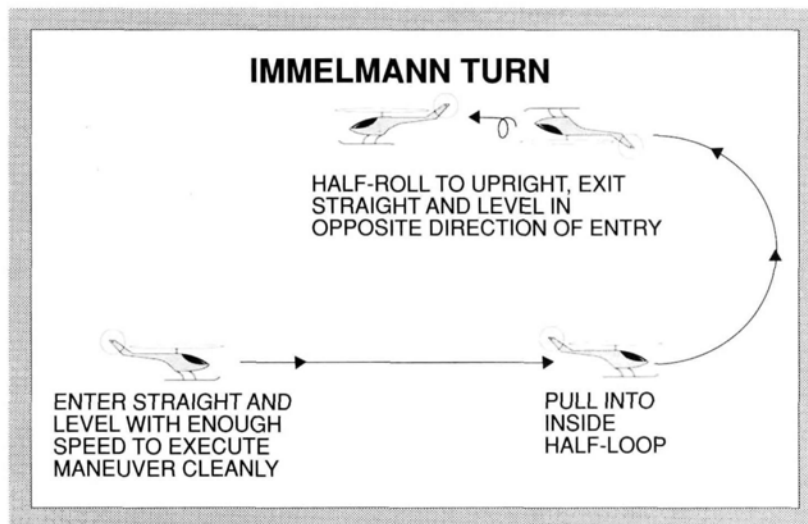
loop and the roll. When you're comfortable performing these maneuvers, you can combine them to produce more complex ones.

Most aerobatic combinations include two or more basic maneuvers, and you can divide each of these into parts, e.g., quarter-loop, half-roll, etc. In complex maneuvers, you rarely have to execute more than one basic maneuver at a time. If you keep this in mind, you'll find some of the "fancy flying" fairly easy.

Here are four maneuvers and descriptions of each of their segments:

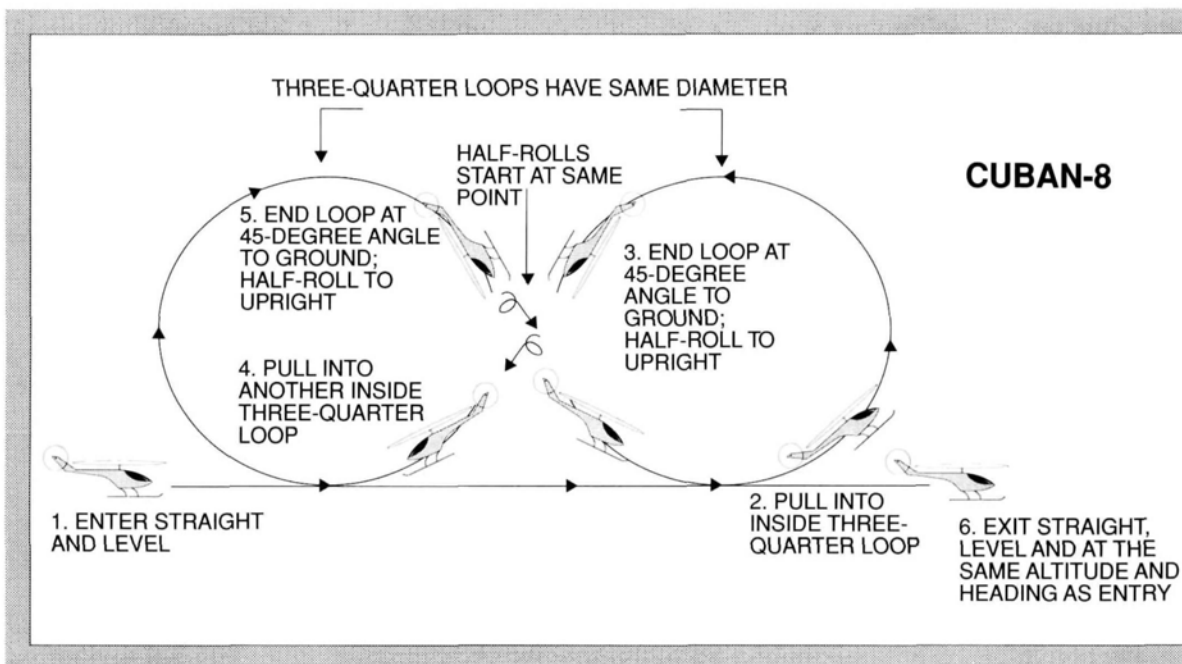
● **Immelmann turn.** Pull the heli up into a half-loop. When it's inverted, roll it to upright (half-roll) and then allow it to exit straight and level. The Immelmann looks deceptively simple. To execute the roll cleanly, the loop must not be so large that it drains the forward momentum. If it's too tight, though, the maneuver will appear rushed. You have to experiment with the entry speed and the size of the loop.

● **The split-S.** This maneuver is basically an inverted Immelmann. Half-roll the helicopter to inverted,





## HELICOPTER CHALLENGE



and pull it through a half-loop back to upright. Again, entry speed and loop size are important. If the machine is flying too slowly, it will appear to be falling out of the sky; if it's flying too fast, the maneuver will look rushed. The split-S is especially impressive if the heli performs a very short inverted-flight segment before it pulls into the loop.

● **The Cuban-8.** This maneuver isn't for everyone; it's definitely a challenge! Start by pulling the model into an inside loop and, when it's three-quarters of the way through the loop, pause, and half-roll it into a descent that's at a 45-degree angle to the ground. Next, pull it back toward upright, execute another three-quarter loop, pause and half-roll it into another 45-degree descent. Smoothly pull it back to upright, and allow it to exit straight and level. The two loops must be of the same size, and the 45-degree "legs" of equal length so that the two half-rolls "intersect" at the same spot in the sky. Obviously, you need a powerful machine to get all the way through the Cuban-8 without stalling.

The reverse Cuban-8 is slightly easier. It's basically the same ma-

neuver, but you pull the heli up into a 45-degree *ascent*, half-roll it and pull it through an inside loop into another 45-degree ascent and half-roll. Finish by looping back to upright. Some people feel more comfortable with this maneuver than with others because the heli completes the half-rolls with its nose pointing skyward instead of toward the ground!

● **Rolling stall turn.** Start by flying the heli straight and level at full speed, then pull it up to vertical. When you've established the vertical line, half-roll the heli, and pause on the vertical line again. As the vertical air speed is bled off, kick the tail rotor to the left and stall-turn until the heli's nose points straight down. Let the heli fall the same distance as it climbed, and recover by pulling its nose up to straight and level.

The heli should exit and enter a rolling stall at the same altitude, so it must be flying very fast to complete the maneuver before it loses too much altitude. It helps to leave the power on and hold some forward cyclic as you start up the line. Reduce the power when you can no longer hold the nose on the

vertical line (at this point, all the potential energy that this technique provides will have been used). If you're really lucky and your helicopter is capable of good vertical performance, try doing a half-roll on the way down, too!

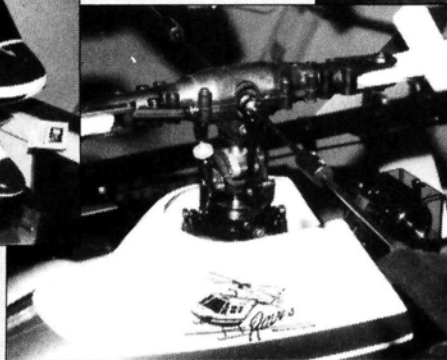
Using these maneuvers, you can invent your own combinations; even the simplest combos can be very eye-catching. All maneuvers consist of lines, circles and angles, just envision a maneuver before performing it, and try to paint the picture in the sky with your helicopter. Until you're comfortable with these maneuvers, remember to practice them at a sufficient altitude. One final note: wind orientation can affect your maneuvers. In general, it's easier to perform loops into the wind, and rolls should be performed downwind.

Next month, I'll discuss hovering aerobatics, including some that involve both forward flight and hover. Until then, keep practicing!

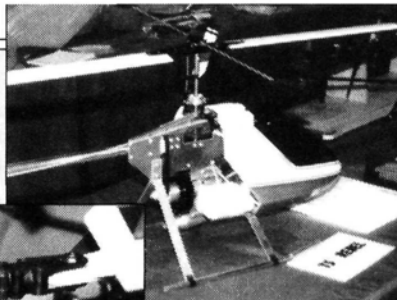
*\*Here's the address of the computer that's mentioned in this article:*  
**Ambrosia Microcomputer Products Inc.**  
 98 W. 63rd St., Ste. 371 Willowbrook, IL 60514.



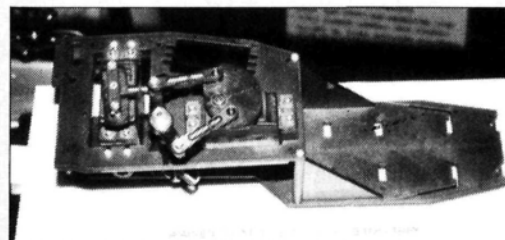
The slick little AH1 Cobra fuselage for Kalt's Whisper electric heli and the Enforcer's Jet Ranger body (both from Hobby Dynamics).



Rave's adjustable-pitch linkage, metal, washout collar and rear gyro plate for the Concept 30.



Formerly a GMP product, the Rebel is now available from Tech Specialties.



Miniature's latest X-Cell update: a composite servo tray with push-pull collective.

# HELIS at TOLEDO

## 1 9 9 1

by JERRY HICKS

**T**HE 37TH ANNUAL Weak Signals R/C Expo at Toledo is now history, but nearly every heli-related manufacturer brought us something new. There were new parts, improved parts, updated parts and conversion parts for any machine you might be flying. There really was something for everyone, from skids to blades.

The big news for this event was the re-emergence of GMP parts—and the Rebel—from Tech Specialties\*. Nearly 10,000 fliers would have been left without parts had T.S. not picked up the line. The T.S. Phoenix is a Legend

conversion kit, but a complete machine is due out this summer.

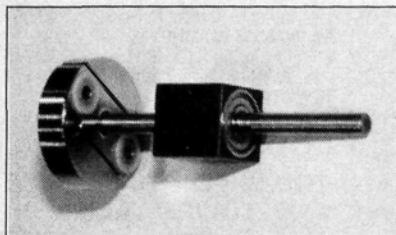
Miniature Aircraft USA\* showed several updated components for the X-Cells. Also exhibiting their new and improved wares were Rave's\*



The Schluter Magic Profi—its top-of-the-line machine.



This police Twin Star from Gary Paddock took 3rd place.



This self-aligning starter shaft for the X-Cell and GMP Cobra machines is available from Cliff Bennett, 14154 Cleveland Rd., Granger, IN 46530.



Linda Tilden of Altech shows the Shuttle "Gold" from Hirobo.





Rave's "Stiletto" allows Heim mechanics to be flown as pod machines.



The winning static heli—a UH-1B by Mike Ellis of Sevierville, TN.



The Air Supply "Apex" transmitter/receiver battery charger from Miniature Aircraft USA.



Robbe's new Hughes 500E fuselage for the Magic 60 and the Junior 50.



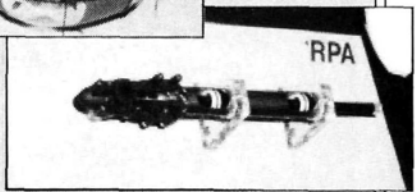
Miniature Aircraft's FAI Triumph—super-sleek and ARF.



This Twin Star by Dave Davis earned 2nd place.



K&S updated parts for Kalt machines (available from Hobby Dynamics).



Robbe's new, double, spiral-wound graphite tube drive for Schluter machines.

# A Growing Hobby! —Many New Products and Update Parts

(Heim), Kalt\* (Kalt), Kyosho\* (Kyosho), Altech \*(Hirobo) and Robbe\* (Schluter). As each manufacturer brings forth new parts and machines, the consumers reap the benefits. This year there was much evidence of product development. It's as if the manufacturers have said, "OK, we have the machines out there; now, let's make them fly better and last longer."

The International Radio Control Helicopter Association also staged its annual fun-fly, with major improvements: the temperature was about 60 degrees warmer and 100 percent drier than in previous years. I caught the tail end of the flying as I returned to my motel room and, from what I saw, the event had many participants and spectators.

Check the photos for the latest in heli equipment. These pictures don't represent the whole story by any means; that would take up this entire Heli Section. You shouldn't miss this event; the official word is that the '92 event will be in the new SeaGate Conference Center downtown.

\*Here are the addresses of the companies mentioned in this article:  
**Tech Specialties**, 218 Vernon Rd., Greenville, PA 16125.  
**Miniature Aircraft USA**, 2324 N. Orange Blossom Trail, Orlando, FL 32804.  
**Rave's RC**, 2005 Mt. Vernon Ave., Alexandria, VA 22301.  
**Kalt**; distributed by Hobby Dynamics, P.O. Box 3726, Champaign, IL 61826.  
**Kyosho**, P.O. Box 4021, Champaign, IL, 61824.  
**Altech**, P.O. Box 391, Edison, NJ 08818.  
**Robbe Model Sport**, 180 Township Line Rd., Belle Mead, NJ 08502.





**NEW**

## Do you need a Digipace II?

- ☐ Do you have a significant investment of time and money in your hobby?
- ☐ Are you safety conscious?
- ☐ Do you use several different ni-cd packs and radios?

Concerning these questions, a bad battery pack can destroy hundreds of dollars worth of equipment with just one mishap (on land or in air).

The Digipace II will manage your battery systems by first evaluating their condition, then recharging, then automatically switching to a trickle rate to keep your cells ready at all times (both Rx and Tx packs simultaneously!). It will accommodate 4 or 5 cell receiver packs and 8 or 9 cell transmitter packs. Charge rates are programmable.

Take precise control of your system's ni-cd operation and safety—it could save you time and money!

**34G200C Digipace II, Asbld. \$159.95**

Call for FREE brochure...  
**1.816.584.7121**

### How to get your Digipace II...

Check with your local dealer first. If he cannot obtain one, you can order direct from Ace (include \$3.00 postage & handling). Catalog \$2.00.



"Made in the U.S.A." since 1953!

116 W. 19th St., P.O. Box 511 Dept#241, Higginsville MO 64037 816.584.7121

## MAGIC

(Continued from page 83)

flaps about  $\frac{3}{8}$  and the ailerons about half as much. You have to get used to the wing's flexing during the launch. Ten-ounce fiberglass cloth is used near the wing's center section, and toward the tips, only 4-ounce cloth is used. With the  $\frac{1}{8} \times \frac{3}{8}$ -inch spruce spars, the wings are strong, but not stiff. The wing has a higher aspect ratio than most sailplanes, and this makes the flexing look even greater than it is.

For such a light sailplane, the speed range is excellent with no ballast. If you fly the design too slowly, performance will suffer. Adding down-trim after achieving a good glide makes it fly better. Trip strips are recommended additions to the top of the wing; I've flown the Magic with and without them. The trip strips improve the plane's stalling characteristics and reduce the likelihood of any tip-stall problems. I've settled on trip strips on the outer half of the wing. My next experiment will be to try Hobby Lobby's\* Z-band turbulators.

The Magic's thermalling characteristics are great, and you soon know it's in a



## BUILD YOUR OWN ROCKET MOTORS!

WE CAN SHOW YOU HOW!

- 40 POUNDS THRUST!
- 50¢ EACH!

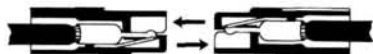
- With a rock tumbler and some simple hand tools, we'll show you how to build YOUR OWN rocket engines in your own garage or workshop for 1/5 to 1/10 the cost of the commercially marketed motors.
- INTERESTED? Just send us \$2.00 and we'll mail you our brochure along with a WORKING SAMPLE of an electric igniter that YOU CAN MAKE YOURSELF from materials you'll find around the house.

**TELL YOUR FRIENDS ABOUT US! We're the DO IT YOURSELF ROCKET people.**

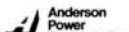
Write to: The Teleflite Corporation  
Department MN  
11620 Kitching Street  
Moreno Valley, CA 92387-9978

### "High-Amp" Powerpole® Modular "Silver Plated" Connector

Rated 30 Amps at 600 V.D.C. Electrical Resistance 250 Microhms  
Color Co-ordinated (Red & Black Lexan Housing)



File No. E26206  
File No. LR25154



Only certified checks or money orders accepted. Minimum order \$14.00; for three packages of 4 Powerpoles (\$4.00 per package + \$2.00 shipping and handling). CT residents add 8.5% sales tax. Prices subject to change without notice.

**DEALER INQUIRIES INVITED.** For further information and dealer prices send SASE and Business Card to:

**SERMOS™ R/C  
SNAP CONNECTORS, INC.®**

Cedar Corners Station  
Box 16787, Stamford, CT 06905

(203)322-6294

### QUICK-BUILT, SUPER TOUGH



The Quick-Built, Super Tough AirCore 40 family Trainer

NEW VHS VIDEO CATALOG - only \$6.95 + \$3 p&h  
(Texas residents please add sales tax)

**U.S. AirCore**

Model Aircraft Manufacturing

4576 Claire Chennault, Hangar 7, Dallas, TX 75248  
1-800-336-0602 (orders only), or (214) 250-1914 for info.



## MAGIC

thermal. With the right control throw, circling—even in low-level thermals—is very good. In down air, just a little down-elevator gets it moving quickly, so you can cover a very large search area.

The Magic is one of the new breed of sailplanes with super performance. Its East Coast competition heritage means it's a design you can count on for long thermal flights. The composite construction techniques make it very strong, yet light. As an extra benefit, the construction time is less than many ARFs. If you like thermal soaring, the Magic will do the trick.

*\*Here are the addresses of the companies mentioned in this article:*

**Weston Aerodesign**, 944 Placid Ct., Arnold, MD 21012.

**UFO**, Satellite City, P.O. Box 836, Simi City, CA 93062.

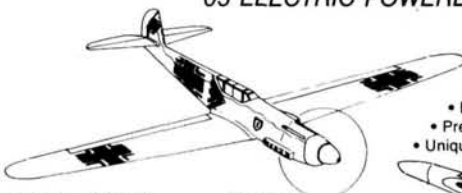
**Hobby Lobby International**, 5614 Franklin Pike Cir., Brentwood, TN 37027.

**Airtronics**, 11 Autry, Irvine, CA 92718.

**Futaba Corp. of America**, 4 Studebaker, Irvine, CA 92718.



## BATTLE OF BRITAIN WARBIRODS 05 ELECTRIC POWERED SAILPLANES



DB-101 ME-109.....\$98.00

Span.....60 inches  
Length.....34 inches  
Wing Area.....420 sq. inches  
Weight.....44 oz. (Powered)  
27 oz. (Glider)

3 Channel Radio Required for Aileron, Elevator and Motor Control. All Prefab Parts Available Separately.



DB-102 Spitfire.....\$98.00

Telephone (714) 775-4153

POST OFFICE BOX J • WESTMINSTER, CALIFORNIA 92684-000J

EACH KIT ADD \$4.00 SHIPPING  
CALIF. RESIDENTS ADD SALES TAX

## RATHER FLY THAN BUILD?

*Imagine just  
having to fuel  
your aircraft and  
being able to fly.*

Learn to fly with two proven winners. D.C. Model Aircraft proudly announces the Sig Kadet Senior and Seniorita, "The Hands Off Trainers," in a complete, ready-to-fly package.

*Absolutely NO building, painting, or covering required.*

Complete packages include:

**Sig Kadet Senior**  
Royal 45 ABC Engine,  
Choice of Airtronics or Futaba  
FM 1991 Radio System  
\$399.95

**Sig Kadet Seniorita**  
Royal 28 ABC Engine,  
Choice of Airtronics or Futaba  
FM 1991 Radio System  
\$349.95

For more information, call or write:  
**D.C. Model Aircraft**, 2763 Avenue  
"L", #143, Lancaster, CA 93536  
(805) 943-8633

# SCALE AIRCRAFT DRAWINGS WW I AND WW II

## Scale Drawings, Rare Photos and Historical Data on popular WW I and WW II Aircraft

These two volumes from the editors of *Model Airplane News* contain incredibly detailed scale drawings, historical data and rare photos of popular World War I and II aircraft. Everything from the Sopwith Camel to the Focke-Wulf 190 is covered. The three-view drawings are by aviation's greatest illustrators, including Wylam, Nye, Larson, Nieto, Karlstrom and others. Each volume features over 35 aircraft and has 150 pages. They're great for scale enthusiasts and aviation buffs, and they can be ordered individually or as a two-volume set. Grab a piece of aviation history today.

Use our convenient order form on page 117.

Credit-card orders, call TOLL-FREE:

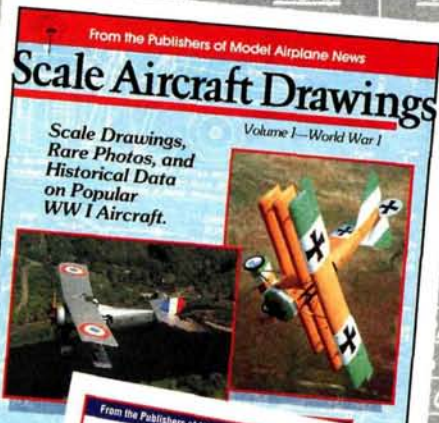
**1-800-243-6685**

In CT: (203) 834-2900

**Only \$12.95 each**

**Special: Two-volume set - \$18.95  
SAVE \$6.95!**

**NEW!**



\*POSTAGE AND HANDLING: in the U.S., add \$3.95. Foreign Surface Mail (including Canada and Mexico), add \$6. Airmail, add \$10. Payment must be in U.S. funds drawn on a U.S. bank, or by international money order. Connecticut residents add 8% sales tax.

**Air Age Mail-Order Services**, 251 Danbury Rd., Wilton, CT 06897



# ENGINE EVALUATION

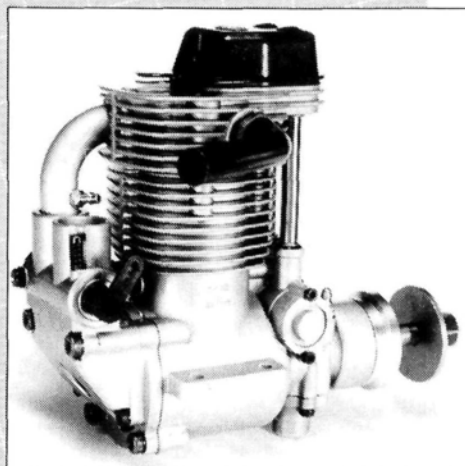
by MIKE BILLINTON

OVER THE YEARS

**T**HE YAMADA 20cc single-cylinder 4-stroke has been the subject of much speculation since prototypes first appeared. In early '87, it showed up in International Class FAI aerobatic (fixed-wing) competitions in Japan, and its power impressed everyone.

It was reported to be one of those rare devices—a “supercharged” model engine—with a power output that was way above the 2hp being generated by other competitive engines. We heard claims of anything up to 4 $\frac{1}{2}$ hp—but not from its manufacturer.

Let's be realistic; such leaps in performance aren't likely unless real supercharging can be made to work in our model engines. This means an engine would have to be pumping effectively at 3 bar or more



The “supercharged” reservoir chamber is at the left rear of the engine. The nipple in the induction tube was fitted during the tests to monitor “supercharge” pressure—4 $\frac{1}{2}$ psi!



To increase security, the prop driver is tapped to accept four screws. Note the double locknuts and the large prop washer—essential for this very-high-torque engine. Also note the solid rod that's used to resist that high output, and the solid, milled piston. The camshaft drive is at the front of engine and has helical gearing.

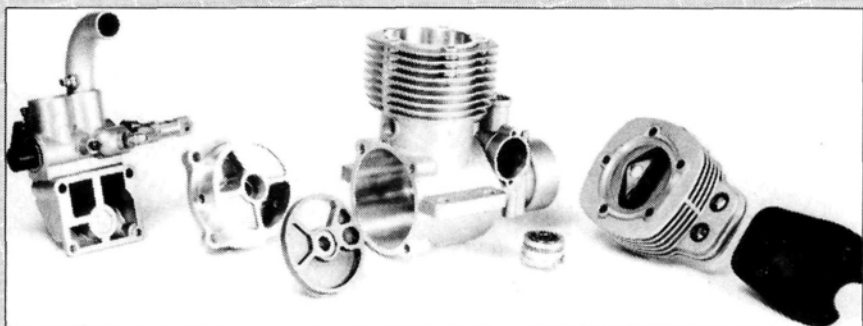
(bar is approximately one unit of atmospheric pressure, or 986 millibars). As many of you know, for reasons of scale effect, this hasn't yet been possible. Few would be brave enough to say that the Japanese model-engine industry won't eventually reach this, but for the moment, the YS F-120 manages a modest 4 $\frac{1}{2}$ psi (i.e.,  $\frac{1}{3}$  bar above atmospheric pressure)

How does the YS F-120 do this? It uses the

well-known model 2-stroke crankcase charging principle. The piston's upstroke draws a mixture of fuel and air into the crankcase, and then its downward stroke forces the mixture out of the lower crankcase up toward the inlet valve.

This isn't like the 4-stroke's usual, very simple, carburetor/induction tube that leads straight from the atmosphere to the cylinder. Because, in 4-stroke engines, the inlet valve opens on alternate strokes, in the YS F-120, the first crank-

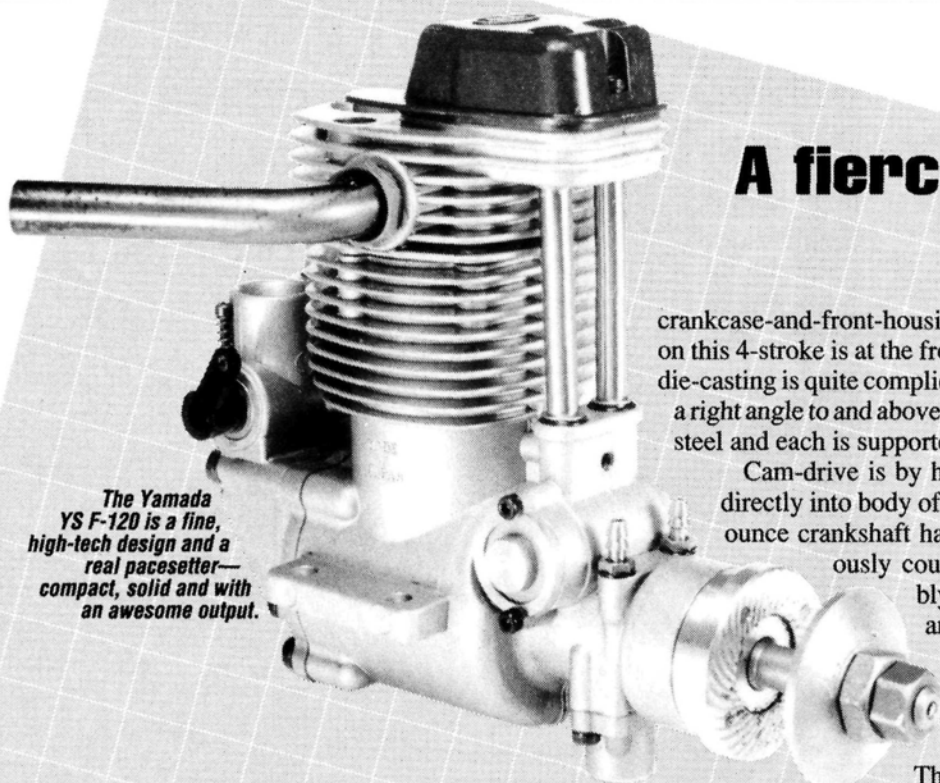
case charge has to wait—trapped in a reservoir chamber between a closed rotary disk and a closed inlet valve—until the second charge is pushed through, and (in theory)



A hardened rotary disk runs on a solid, phosphor-bronze, bearing pin (not in this photo). Note the “pent-roof” combustion chamber, which gives detonation-free, solid, combustion characteristics.

PHOTOS BY MIKE BILLINTON





## A fierce 4-stroke

*The Yamada YS F-120 is a fine, high-tech design and a real pacesetter—compact, solid and with an awesome output.*

crankcase-and-front-housing combination. The camshaft drive on this 4-stroke is at the front, so the 9-ounce, aluminum-alloy die-casting is quite complicated. The twin-lobe camshaft sits at a right angle to and above the crankshaft. Both are of hardened steel and each is supported in two ball bearings.

Cam-drive is by helical gearing that has been milled directly into body of the crankshaft. This one-piece 5 1/2-ounce crankshaft has a 10 1/2mm-thick web that generously counterbalances the piston/rod assembly. The highly finished crankpin has an extension for the rotary disk drive (as is usual in 2-stroke racing engines).

The propeller driver is held on the crankshaft by a Woodruff key.

both charges are persuaded through the now-opening inlet valve.

It isn't likely that this method will force much more than the usual full 20cc piston-stroke displacement of fuel/air through the inlet valve, but test results and pressure readings taken off the inlet tract show positive pressure. In fact, pressure is high enough to produce some gain from the extra cylinder filling, so there's an overall power increase. (This is true even after you've allowed for the pumping losses that result from using the crankcase in this way.)

Like Yamada's fine YS 60 2-stroke aerobic engine, this 4-stroke unit has the company's high-pressure, crankcase-charged, fuel-supply system to ensure an absolutely steady, aerobic performance. It again allows a relatively large carburetor (11mm choke, compared with the 9mm of the Enya R120), which should contribute to the performance of this powerful 4-stroke.

### MECHANICAL FEATURES

Yamada has maintained its faith in the robust, one-piece,

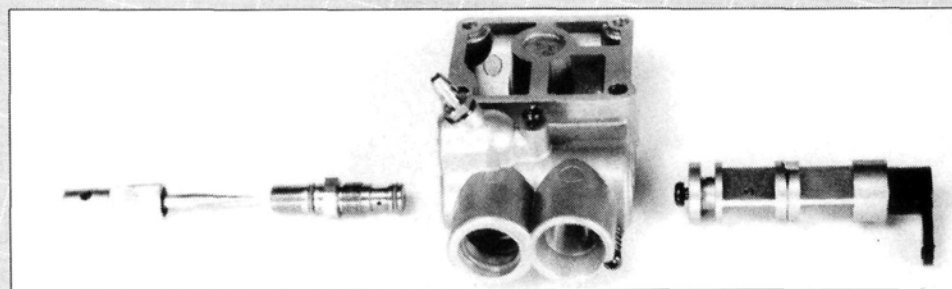
The connecting rod has been milled out of a solid aluminum alloy that has a high silicon content (similar to ABC piston material). The 11mm-wide shank is an average of 6mm thick. There aren't any bushings at either the little or the big end, so Yamada must have confidence in the superior bearing quality of its high-silicon rod; it also knows that adequate lubrication is being provided because all the fuel/oil mixture is routed through the base of the crankcase. (This is unusual in 4-strokes.)

The flat-top piston has been milled out of high-silicon aluminum alloy that has been turned to give a close, .002-inch skirt clearance and a .003-inch crown clearance in bore. There's a single, cast-iron, unpegged compression ring, and the piston and ring together weigh 15 grams. The brass cylinder liner has been plated with nickel-silicon and subsequently honed internally.

The die-cast, aluminum-alloy cylinder head incorporates a 14mm inlet valve (12.8mm effective throughway) and a 12mm exhaust valve—both angled at 12 degrees to bore axis. There's the usual combined, one-piece, phosphor-bronze valve seat and guide. The semi "pent-roof" combustion chamber has the surrounding squish areas set at a clearance of .027 inch to give a geometric compression ratio of 8.84:1.

Hardened-steel rocker arms that give a valve-lift ratio of 1.27:1 are operated by the usual pushrods by means of cam followers. With an actual cam lift of 2.27mm, this gives a final valve lift of 2.88mm.

The carburetor/rear cover/rotary-disk assembly is bolted into the back of the crankcase, and



*The one-piece, double-blade throttle barrel: on its right side, note the blade that controls the initial entry of air from the atmosphere (it goes down into the crankcase); meanwhile, the left-hand blade controls the routing of the fuel/air mixture from the lower crankcase to the induction pipe (not shown here) and up to the inlet valve.*

# SPECIFICATIONS

## YS F-120

O-rings seal the induction tube that connects the reservoir chamber to the cylinder head. The hardened-steel rotary valve is driven by a crankpin, and as the piston rises, the usual port (2-stroke style) in the backplate is uncovered. When the piston descends, the "pressurized" fuel/air mixture is pushed into a separate, remote reservoir that has been uncovered by the rotating disk. The total volume of this "waiting room" (from the disk face to the closed inlet valve) is approximately 20cc—significantly similar to the volume swept by the piston. A lesser volume would increase pumping loss, and anything much greater would undesirably decrease mixture velocity.

The one-piece, nickel-plated, "butterfly"-style throttle barrel has two blades that operate simultaneously on both air tracts: one, the separate incoming air supply; and the other, the fuel/air that's subsequently transferred from the crankcase to the cylinder head.

At full throttle, it seems that almost all the fuel is dumped into the incoming air stream and thus into the lower part of the crankcase; but as the throttle closes, progressively more of the fuel mixture is drawn through the idle-mixture slot in the throttle blade and out directly into the induction tube. It therefore bypasses the crankcase route used at full-throttle openings. This might be because, at low throttle settings/low-rpm points, the mixture would otherwise stay too long in the lower crankcase, draw too much heat away from it and perhaps lead to fuel-setting problems. I'm just guessing, however; at small throttle openings, the reason for the division of the supply between the incoming stream and the induction stream is still a puzzle to me—one I haven't yet resolved by contacting the engine's designer.

The YSF-120 needle valve has O-rings to maintain airtight fuel settings, and it's commendably robust at a 3mm-diameter stem.

### POWER TEST

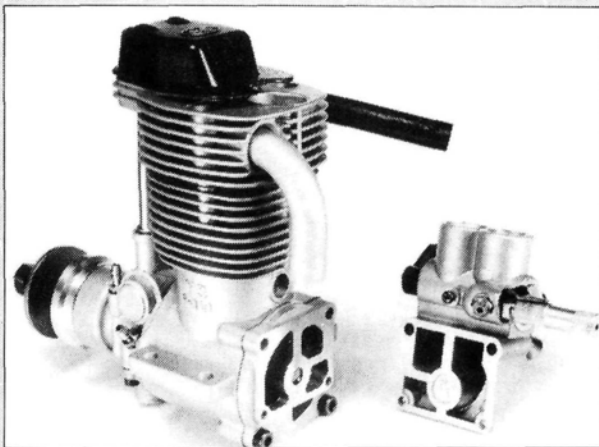
I recorded rpm with a number of propellers, and improvements were apparent after only 30 minutes of running. After I had installed all the YS pumper carburetor plumbing, the engine always started swiftly and easily. Early indications led me to expect high levels of power.

My grasp of Japanese script is poor, but 10-percent-nitro/20-

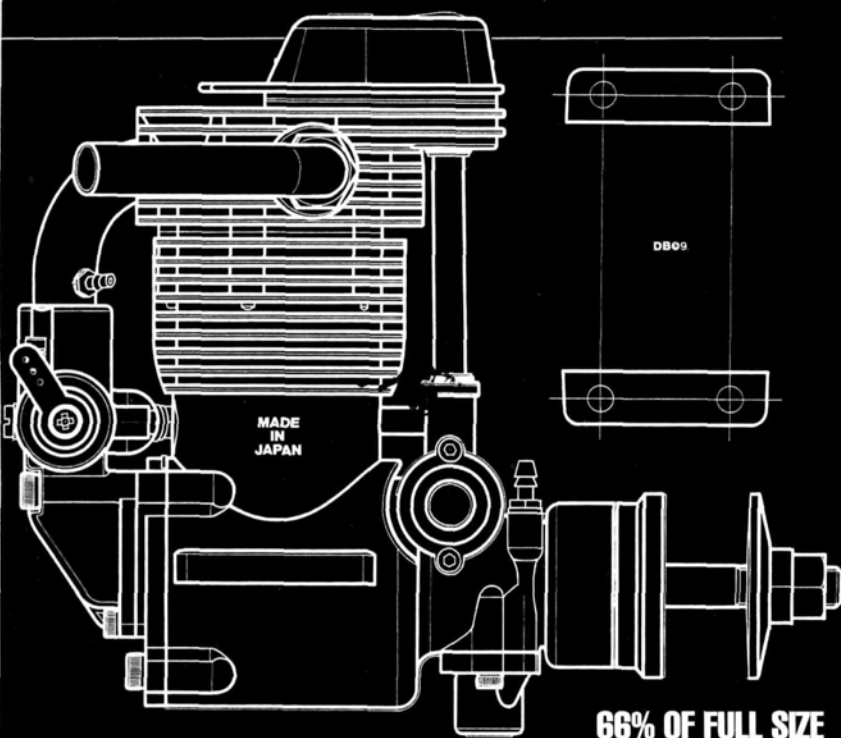
*The right-hand chamber (on the needle-valve side) is the reservoir and transfer passage from the lower crankcase to the inlet valve. The needle valve meets YS's usual high standards of effectiveness and rigidity.*

### DIMENSIONS & WEIGHTS

<b>Capacity</b> .....	1.2198ci (19.9897cc)
<b>Bore</b> .....	1.197 inch (30.4mm)
<b>Stroke</b> .....	1.084 inch (27.53mm)
<b>Stroke/bore ratio</b> .....	0.9056:1
<b>Timing periods (poppet valve)</b> .....	Inlet opens - 37° BTDC Inlet closes - 57° ABDC Total period - 274° Exhaust opens - 84° BBDC Exhaust closes - 26° ATDC Total period - 290° Overlap - 63°
<b>Timing periods (rotary valve)</b> .....	Disk opens to lower crankcase - 73° ABDC Disk closes to lower crankcase - 37° ATDC Disk opens case to inlet tract - 48° ATDC Disk closes case to inlet tract - 37° ABDC
<b>Combustion volume</b> .....	2.5cc
<b>Geometric compression ratio</b> .....	8.84:1
<b>Squish clearance</b> .....	0.027 inch (.68mm)
<b>Squish area</b> .....	0.26 square inch (1.68cm <sup>2</sup> )
<b>Squish angle</b> .....	0°
<b>Crankshaft diameter</b> .....	0.591 inch (15mm nominal)
<b>Crankpin diameter</b> .....	0.3145 inch (8mm nominal)
<b>Prop-shaft thread</b> .....	8x1mm
<b>Wristpin diameter</b> .....	0.275 inch (7mm)
<b>Connecting-rod centers</b> .....	44mm
<b>Carburetor bore</b> .....	11mm
<b>Engine height</b> .....	5.23 inches (133mm)
<b>Engine width</b> .....	2.68 inches (68mm)
<b>Engine length</b> .....	4.98 inches (126.5mm)
<b>Mounting holes</b> .....	25x58x5mm
<b>Frontal area</b> .....	9.9 square inches
<b>Weight (overall)</b> .....	33.5 ounces (950 grams)
<b>Crankshaft weight</b> .....	5.35 ounces (153 grams)
<b>Piston weight</b> .....	0.55 ounce (15 grams)
<b>Connecting-rod weight</b> .....	0.30 ounce (9 grams)







**66% OF FULL SIZE**

#### PERFORMANCE:

**Max. b.hp** ..... 2.3 @ 12,200rpm (open exhaust /10% nitro)

**Max. torque** ..... 240 oz./ins. @ 6,200rpm (open exhaust /10% nitro)

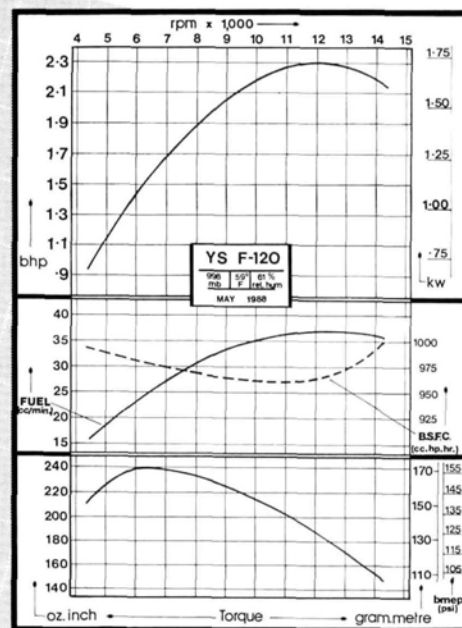
#### PERFORMANCE EQUIVALENTS:

b.hp/ci ..... 1.88  
 b.hp/cc ..... 0.115  
 Ounce inch/ci ..... 196.70  
 Ounce inch/cc ..... 12.00  
 Gram meter/cc ..... 8.55  
 b.hp/pound ..... 1.098  
 b.hp/kilo ..... 2.42  
 b.hp/sq. inch frontal area ..... 0.232

#### RPM ON STANDARD PROPELLERS:

15x8 Graupner ..... 9,450  
 14x7 Graupner (three-blade) ..... 9,550  
 16x5 Zinger ..... 9,966  
 13x10.5 MK Glass ..... 10,400  
 14x8 Airflow ..... 10,670  
 14x7 Graupner ..... 10,720  
 13x6 MK Glass ..... 13,095

**Manufacturer:** Yamada Mfg. Co. Ltd., Inuyama, Aichi, Japan  
**U.S. Distributor:** Futaba Corp. of America, 4 Studebaker, Irvine, CA 92718.



percent-synthetic-oil/70-percent-methanol fuel seemed to be indicated. The engine didn't come with a muffler, so I just used the supplied short-stub exhaust pipe (in effect, an open-exhaust setup).

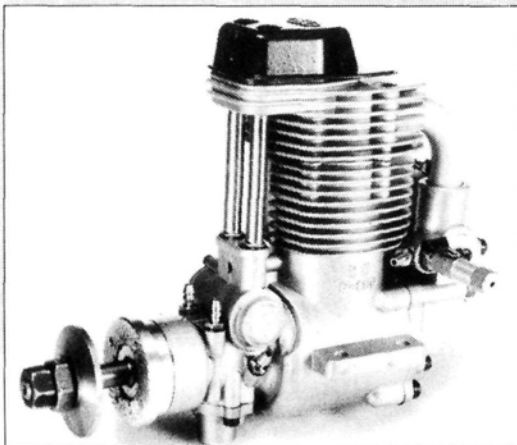
It's surprising that the engine doesn't come with a muffler to meet FAI noise regulations, because it's certain to be used competitively. Its users probably fit a variety of commercial mufflers, hoping that Yamada will eventually offer its own matching unit. There's no question about the necessity of a muffler, because this engine sounds fierce—even at low rpm!

The first torque figures indicated a massive performance at relatively low rpm! Torque settled down near to the levels reached by competitors' engines only when rpm had passed 10,000. The propellers recommended—13x12 and 14x10—will probably hold the engine back to between

approximately 8,500rpm and 9,000rpm, but which competitive propeller would be able to hold the YS F-120 back to a maximum torque point between 6,000 and 7,000rpm? Perhaps the 14x14 "square" propeller is called for.

All indications are that the YS supercharging system as operated here has led to a distinct uplift at low rpm and that, perhaps, the correct FAI propeller sizes are still being sought for this engine. What happens to the horsepower levels of this YS F-120 if the rotary-valve and/or poppet-valve timings are altered to favor higher rpm?; at present, they clearly enhance

(Continued on page 116)



The left nipple is for the air-pressure line that comes from the sealed fuel tank. To the right of that is the nipple that takes fuel from the tank. Below the cam-drive casting is the nipple that routes fuel from the pressure reservoir through a line to the nipple on the right (adjacent to the needle valve).

# SMALL STEPS

## A SCALE SCRATCH-BUILDING PRIMER

by JOE WAGNER

**I**F YOU HAVE the urge to improve your modeling skills—to move up from ARFs and airplane kits to the prestigious scratch-building level—it's best to start with small aircraft. You'll learn efficiently, with minimal investments in time, space and materials. In addition, the mistakes you'll inevitably make are much less troublesome to correct on small models than on quarter-scale projects.

### FANTASTIC FOKKER

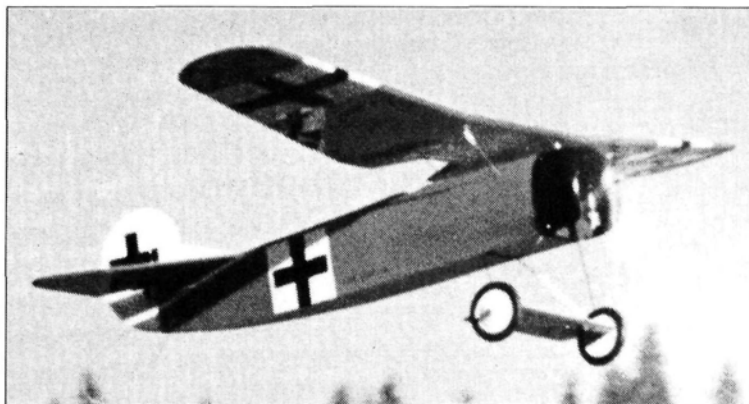
**H**arry Stewart's neat Fokker D-8 is an excellent example of a small scratch-building project. It's essentially a  $\frac{2}{3}$ -size rendition of a "flying scale" free-flight airplane that was designed about 50 years ago by AMA Hall-of-Famer

Earl Stahl. (It's included in *Gas Models\**—a book about classic gas model designs from the early '40s.

Harry's Fokker spans 39 inches; it has a Cox Texaco .049 for power; and its ready-to-fly weight is only about 14 ounces! Harry says, "It's extremely stable, yet easy to control. It can loop, spin and roll if I want; but mostly

it just putts around the sky looking cute." What I find especially noteworthy about

this little WW I R/C model are Harry's innovations. The wing attachment is one



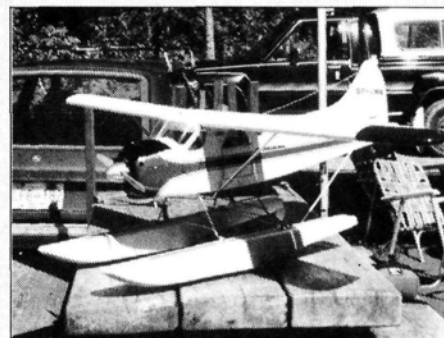
Although it isn't a true scale model, Harry Stewart's (Nevada City, CA) Fokker D-8 shows off all the glory of the WW I "look."

### AVOIDING AILERON STALL

**F**or more than 25 years, George Penniket of Nelson, BC, Canada, has been corresponding with me about small R/C models. In a recent letter, he reported: "Flew my Beaver on floats, and dunked it at the end of the flight—it fell a victim to adverse aileron effect, I think. When I tried to bring the plane out of a steep right turn, it just tightened up more and went into the water almost vertically. (Very little damage, luckily!)"

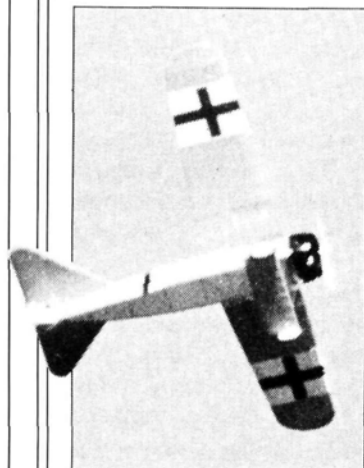
From George's description, the culprit wasn't "adverse aileron effect," i.e., the airplane's tendency to bank one way and yaw the other when its ailerons are deflected. This happens when a lowered aileron increases the drag on its wing panel, while a rising aileron on the opposite side decreases the drag on its wing panel. What really happened was that George's float-equipped Beaver crashed because of *aileron stall*.

One thing that all private flight instructors make an issue of is: *never try to use the ailerons to pick up a*



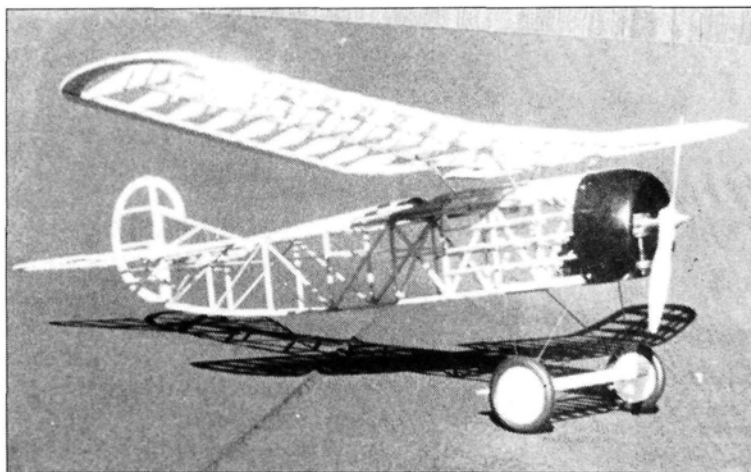
This picture of George Penniket's beautiful, fine-flying DH Beaver on floats shows you how *not* to photograph a model airplane! Avoid harsh lighting and cluttered backgrounds in your pix!

*dropped wing at low speed. Use the rudder for this.* If the airplane is in a steeply banked turn, flying close to its stalling angle, and you try to raise its low wing with down-aileron, you'll push its attack angle past the stalling point. Instantly, that wing's drag will shoot way up; its lift will drop; and you'll be in serious trouble. Aileron control works fine when the wing is in "cruising attitude." But when the plane is turning low and slow—in full-scale or R/C flying—use the rudder instead of the ailerons to level your wings quickly!



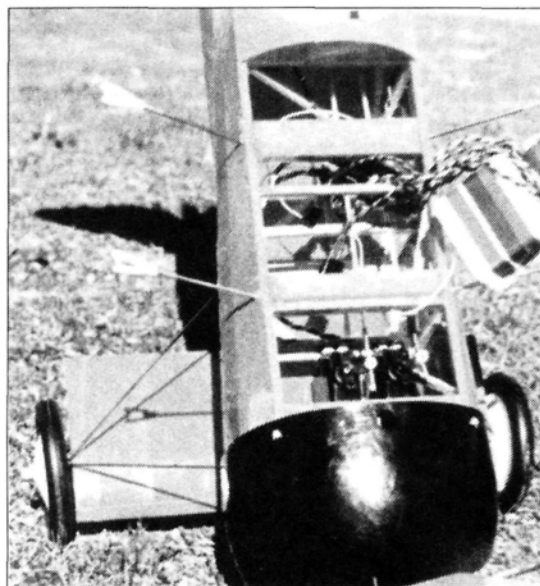
At a certain altitude, it's hard to tell the  $\frac{1}{2}$ A Fokker from a true scale model. Even if it were fully detailed, however, it couldn't be any more fun!





*Ready for its MonoKote covering, the Fokker's structure seems too pretty to be hidden! It needs a 7-inch prop to blow air past its big cowl.*

example. Control-type adjustable clevises on the ends of the  $\frac{1}{16}$ -inch wire cabane struts are clipped onto aluminum tabs that are embedded in the wing's center section. This makes it easy to alter the wing's incidence and even realign the plan-view, if necessary.



*A close look at the inside of the D-8 reveals the forward-mounted R/C gear and the clevis wing-mounting system.*

The D-8's exceptionally short nose called for reducing its aft area mass to the bare minimum, and this meant using the same built-up construction that Stahl chose for the original free-flight model. As a further precaution against tail-heaviness in his R/C version, Harry took care to in-

stall the "mechanics" as far forward as possible. He even devised an ingenious method of lightweight control-surface actuation. The Fokker's cowl came from a plastic pop bottle, and its Cannon receiver and World\* S-22 servos are powered by a homemade 65mAh Ni-Cd pack

built from a disassembled, commercial, 9V, rechargeable battery.

Harry's clever little Fokker project nicely demonstrates the methodology of scratch-building: use whatever you can "as is," and then adapt or create anything else you need to complete your project. When you work this way, you end up with a truly personal achievement—one you

can take pride in as your very own.

*\*Here the addresses that are pertinent to this article:  
Gas Models; distributed by Air Age Mail Order Services, 251 Danbury Rd., Wilton, CT 06897.  
World Engines; now ISC International, P.O. Box 40116 Indianapolis, IN 46240.*

# SLIMLINE MUFFLERS

**NEW**

- 4 CYCLE SMOKE MUFFLERS
- GIANT SCALE MUFFLERS (SMOKE OPTIONAL)
- LARGE VOLUME (LOW NOISE) SIDE-MOUNT MUFFLERS

Slimline offers the most complete line of in-cowl mufflers, smoke mufflers, and exhaust systems. Designed to bolt on to each specific engine, these mufflers are machined out of high quality aluminum bar and tubing. All products are backed by a lifetime guarantee.

For a complete catalog send \$1.00 for postage and handling to: Slimline Mfg. P.O. Box 3295 Scottsdale, AZ 85257

*Slimline*  
MANUFACTURING

**MADE IN USA**

**BUILD FASTER & STRONGER**

**MIGHTY MINI-VAC™**

**Electric Vacuum Bagging System for Foam Core Wings**

**\$74.95\***

**Complete, Easy to Use**

\*Add \$5 shipping and handling, California residents add 6.5% sales tax

*Dealer Inquiries Invited*

*VISA and Mastercard Accepted*

**BUILDING WITH  
TODAY'S TECHNOLOGY**  
Bagging Materials & Supplies

**CST**

**Composite Structures Technology**

Dept. CC, P.O. Box 4615  
Lancaster, CA 93539

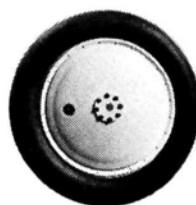
Phone/Fax 805/723-3783

# WILLIAMS BROTHERS ACCESSORIES



## PILOTS WHEELS

STANDARD • SPORTSMAN  
RACING • MILITARY  
VINTAGE • SMOOTH CONTOUR  
BALLOON • GOLDEN AGE



## ENGINES

PRATT & WHITNEY • WRIGHT • LE RHONE



## PARTS

PRATT & WHITNEY • LE RHONE  
WRIGHT • Gnome



## GUNS

LEWIS • VICKERS • SPANDAU • PARABELLUM



SEND \$3 FOR FULLY ILLUSTRATED CATALOG  
DEPT. MAN 181 PAWNEE ST. SAN MARCOS, CALIFORNIA 92069



## TOWING

(Continued from page 88)

longer see my biplane, Dave detached the towline from the sailplane's nose. After that, I landed the Aeromaster and watched Dave fly his sailplane for 22 minutes. When he landed, we cheered and then began to digest what we had learned and to discuss improvements.

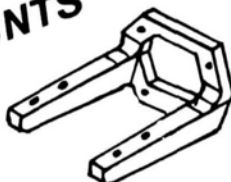
## LESSONS LEARNED

• Make sure that you'll be able to see your planes from a distance. A big bull's-eye, a stripe, or your AMA numbers on the right wing will keep you oriented when the planes are up so high that you can hardly see what they're doing. (If you can't see it, you can't fly it.) Also, we could see the sailplane, but my tow-plane was a mere speck. I recommend that you use a tow-plane with a wingspan that's as large as or larger than that of the sailplane. If you really want some altitude, this is a must.

Jose Tellez solved this problem for us by letting me use his Senior Telemaster as the tow-plane. It's the best tow-plane we've tried so far, and it's large enough to see. In addition, Jose designed a tow-

(Continued on page 115)

## IT'S MODEL TATONE for precision Aluminum MOTOR MOUNTS



### FOUR CYCLE

Alloy Alluminum  
Machined Beams

Drilled & Tapped  
90° Thrust Line

#### O.S.

FS-20	\$7.50
FS-40/40S	8.95
FS-48	9.95
FS-60/75/90	12.95
FS-61	12.95
FS-120/120S	19.95

#### ENYA

35/40-4C	\$8.95
46-4C	8.95
60/80/90/	
120-4C	12.95
120-4C	21.50

#### SAITO

FA 40/45	\$8.95
FA 65	12.95
FA 120	19.95

#### HP

VT-21	\$7.50
VT-49	8.95

#### WEBRA

T4-40	\$8.95
TA-60/80	12.95

#### Undrilled

60-90	\$11.25
-------	---------

### TWO CYCLE

Machined Beams  
Engine Mounting  
Bolts Incl.

1/4 Sh Bm	\$3.90
1/2 A Lg Bm	4.10
.09	4.75
.15 Lg Bm	4.95
.19-3.5CC	5.85
.29-40 Lg Bm	6.80
.40-61 Sh Bm	6.50
.40 RV Pylon	7.75
.60 Pattern	10.25

### GIANT SCALE

Alloy Alluminum  
Machined Beams  
Engine Mounting  
Screws Incl.

OS Max 90	\$19.25
OS Max 1.08	19.95
Super Tigre-2000,	
2500 & 3000	19.95
Zenoah G-38	19.95
Quadra	
35/40	21.50

C.B. TATONE, INC.

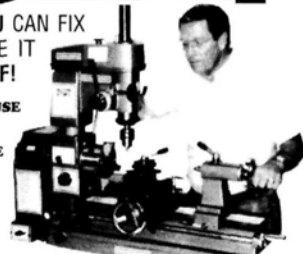
21658 Cloud Way • Hayward, CA 94545  
In CA 415-783-4868 • Out CA 800-482-8663

If not available from your hobby shop, ORDER DIRECT. Check, MO, VISA, MC or COD accepted. Add \$2.50 for S&H, 2.00 for COD. California residents add 6 1/2% sales tax.

## SMITHY LATHE • MILL • DRILL

NOW YOU CAN FIX  
OR MAKE IT  
YOURSELF!

- EASY TO USE
- SAVE \$\$\$
- SAVE TIME



OWN A MACHINE SHOP

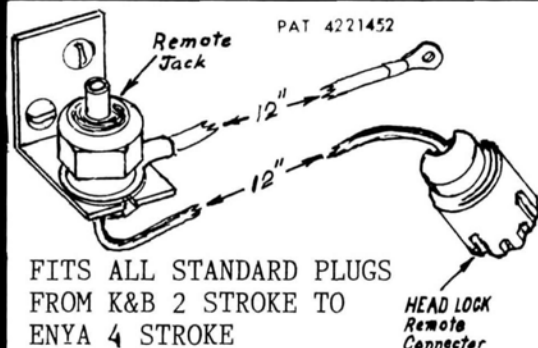
BUY DIRECT! AS LOW AS \$995

1-800-345-6342

FREE!

BROCHURE  
OR  
VIDEO DEMO

OVERLAND CO.  
3023 E. 2ND ST.  
THE GALLIES, OR 97058  
FAX 503-296-1023



FITS ALL STANDARD PLUGS  
FROM K&B 2 STROKE TO  
ENYA 4 STROKE

HEAD LOCK  
Remote  
Connector

## "HEAD LOCK" REMOTE

This product is designed for use on cowled engines, helicopters, boats, cars and general safety by removing the glow plug connector from close proximity to the whirling propeller. The "REMOTE" unit consists of a miniature "HEAD LOCK" connector and a remote jack that are electrically coupled by 12 inches of teflon insulated wire and a 12 inch ground lead. A bracket is supplied with the jack for convenient mounting. The "JACK" is compatible with all "HEAD LOCK" connectors.

St.#021 Single-\$9.95, St.#022 Twin-\$13.95

If not available write direct, add \$1.00 \$2.00 outside US

MODEL PRODUCTS CORP. P.O. BOX 100 ALLAMUCHY, N.J. 07820 (908)850 1508



# SR Battery Packs...

## You get what you pay for!

SR BATTERIES, INC., BOX 287, BELLPORT, NEW YORK 11713 (516) 286-0079 FAX (516) 286-0901

### TOWING

line release for it that's controlled by the fifth channel on his radio. This setup increases the realism and safety.

- Make sure the sailplane's battery pack can handle the expected flight times. Recently, several people took turns flying Dave's sailplane. After more than an hour (the plane had never flown that long before!), they lost it over a hill when its battery pack died. (Bud "Jungle Man" Parriott found the plane intact.)

- Don't let the tow-plane run out of gas. If it does, begin a dive immediately to maintain control and release the towline.

### STUPENDOUS STUNTS

On several occasions, we've been able to trim the tow-plane and the sailplane to fly "hands off," while we relaxed on the runway. We've towed at night, too. There aren't any thermals, but the sight is awesome! Making the tow-plane drop the towline in front of us during a low-altitude flyby is also a real thrill. The only stunt I *don't* recommend is towing the sailplane with a helicopter. (We've tried this, too—need I say more?)

If you're as successful with R/C towing as we've been, you'll finally get the

(Continued on page 116)



CONSOLIDATED PBY-5A CATALINA 81" SPAN \$269.95  
NEW 62" SPAN FOR .20 ENGINES



GRUMMAN ALBATROSS HU-16B 81" SPAN \$269.95



CANADAIR CL-215 81" SPAN \$259.95

All models use .40 2C engines and feature a fiberglass fuselage with pre-joined halves. The kits include vacu-formed cowls and nacelles. The wings and empennage are made of small-bead, low-density foam and are pre-slotted for the spars. The kits feature pre-sawn spars, and all wood is included to build the planes. Retractable landing-gear kits are available for the Canadair and the Albatross. The 120-minute video covers building and flying. The kit comes with a 35-page construction manual with step-by-step instructions and detail drawings. **Retractable landing-gear kit \$179.95; Video \$24.95.**

G&P Sales 410 College Ave., Angwin CA 94508

(707) 965-3866

CA Residents add 6.25% sales tax.

Please send \$1.00 for information sheet.

.40 to .60  
48" Span 712 Sq. in.  
5 1/2 To 6 1/2 Lbs.  
Rudder, Elevator,  
Aileron, Throttle.  
Sheeted Foam  
Wing & Floats.  
Ply & Balsa  
Fuse & Empennage.

AN EASY BUILDING, GREAT FLYING, SPORT SEAPLANE By Westwood-Weston



\$84.50

9.25 S&H

\$93.75

VISA • MC • COD

6% CA Tax

Where Applicable

SASE For Brochure DIRECT SALES ONLY

## THE BEAST

**John Sullivan**  
MODEL FLOATPLANE PRODUCTS

1421 Second Street  
Calistoga, CA 94515  
Telephone  
(707) 942-5095

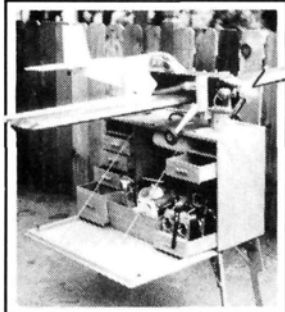
# THE EAGLE'S LAIR

The Eagle's Lair is built with fliers in mind by men who fly, and it enables hobbyists or professional fliers to bring their shops to the field. It's made of the finest red oak hardwood and red oak plywood with brass hardware. A light oak stain and a polyurethane finish make the Lair a tough competitor. Measuring 31 1/2 x 11 1/2 x 19 1/2 with adjustable folding legs, foam-covered fuselage holders and a removable flight tray, the Eagle's Lair is the only flight box you'll ever need.

(A smaller version is available.)

Visa and Mastercard welcome.

**Contact: R/C Products Unlimited**  
89340 Dahlin Rd., Florence, OR 97439. (503) 997-8878



Made in America

**Cost: \$159.95**  
plus shipping and handling

## THE NEW GENERATION OF SPEED CONTROLS



YOUNG ENGINEERING is proud to present a totally new line of electronic speed controls. The new ESC-2X and ESC-3X are packed with the features R/C electric pilots need: **LIGHTWEIGHT (1.5 oz.), HIGH EFFICIENCY MOSFETS (0.01 V/A), OPTO-ISOLATION,** and when used with the AB-1, **AUTO-CUTOFF and BEC.**

For those who want a simple On/Off throttle, the **ESC-2X** is the one to use. It features a fully electronic circuit that is lighter, smaller, and more powerful than relay units.

For higher performance, there is the **ESC-3X** with a fully electronic **Off/Low/Hi** control. It features an adjustable Low-throttle speed, allowing you to dial in the perfect cruising or landing speed.

ESC-3X \$39.95 ESC-2X \$34.95 AB-1 \$7.95 \$2.50 Shipping  
YOUNG ENGINEERING 710 SILVER SPUR ROAD #181 ROLLING HILLS ESTATES, CA 90274

## TOWING

(Continued from page 115)

power guys and the sailplane nuts together...at the same field! Happy flying, and remember: it isn't *how* you do it, it's whether or not you *can* do it! ■

## YS F-120

(Continued from page 111)

the low-rpm band. I monitored fuel consumption and found it reasonable.

## OTHER TEST DETAILS

I finalized the main fuel-needle setting at seven-eighths of a turn open. I set the fuel-regulator idling (under the front housing) at three turns open, though this was much less critical.

After the first 10 minutes of running, I set valve lash to .003 inch clearance, and it remained stable after that.

On a 15x8 Graupner nylon propeller, idling was at a steady 1,800rpm. Throttle response was unfailingly swift and predictable—gratifying to demanding R/C pilots.

Despite the relatively high cylinder

(Continued on page 118)

## Cleveland Giant Scales

GIANT SCALE BUFFS! ★

World's Largest Gas Plans Assortment

INTERNATIONALLY FAMOUS C-D QUALITY

MASTER MODELS PLANS 54'S D. Demoselle 21 \$48

78 Consoat Cat PBYS \$60, 72 Cor. 02U1/4 L&S \$56

104 Con. Cat PBYS \$74, 62 Howard Race Ike \$45

96 Wright Navy Race \$56, 77 Boeing B-17G Tail \$52

52 W-Wmsl 121 Red L \$56, 103 Bee B-17G Fort \$53

77 W-Wmsl 121 Red L \$68, 68 Doug 0-46A Obs \$46

84 Fokker D-7 Fr. \$49, 108 Sikor S-38 Amph \$62

60 Howard Pete Race \$42, 60 Bee 100 Sport \$48

70 Bayles Gee-Bee \$56, 90 Bee 100 Sport \$62

60 Supermarine S.6B \$38, 90 Stins' A Low Wing \$62

89 Supermarine S.6B \$52, 80 Martin 74 T4M-1 \$52

63 Curt. Hawk P-46 \$56, 78 H-Pge 0400 Bomb \$56

94 Curt. Hawk P-46 Fr. \$68, 104 H-Pge 0400 Bomb \$65

62 Lockheed Vega \$35, 65 M.China Clipper \$66

74 Doolittle G-B 11 \$58, 97 M.China Clipper \$80

95 Monocoupe Sport \$54, 68 West Whirlwind \$43

80 Hall Spr Bulldog \$58, 68 Ryan Navion \$46

107 Aerocraft C-3 Spr \$48, 68 B.Bonanza V Tail \$52

61 Douglas 0-38 Obs \$34, 77 Luscombe Sedan \$35

122 Douglas 0-38 Obs \$58, 73 N.A. Mitch Bomb \$62

94 Page's Curt Racer \$50, 65 M.Marauder B-26 \$62

71 Martin B10 Bomb \$44, 81 DH Mosquito B's \$50

78 Turner's W-W Rac \$52, 108 DH Mosquito B's \$50

53 Cur Goshik F11C2 \$48, 98 Stear PT17 Kaydet \$59

94 Cur Goshik F11C2 \$60, 99 N.Bikg. Dow T61 \$75

96 DeHav Comet Rac \$44, 71 Doug. DC-3 Tran. \$64

62 Haw Mr. Mulligan \$44, 95 Doug. DC-3 Tran. \$64

94 Haw Mr. Mulligan \$56, 86 Hawk Texaco 13 \$52

63 Boeing P-26A Fr \$45, 108 Cor.02U1/4 L&S \$68

84 Boeing P-26A Fr \$58, 60 Douglas M-2 Mail \$32

69 Waco C-6 Cabin \$44, 68 Bristol Bulldog Fr \$44

64 Beech C17-B Stag \$44, 59 Brown Race MSL A. \$48

96 Beech C17-B Stag \$56, 107 Grum. Bearcat F8F \$58

55 Lock. 11 Electra \$38, 73 Travel Air 6000 \$48

82 Lock. 11 Electra \$46, 107 Mart MB-1 Bom \$38

62 Stinson T W SR7 \$45, 91 Lindbergs NX-211 \$48

81 Stinson T W SR7 \$55, 108 Fairch PT19 Tr \$65

122 Stinson T W SR7 \$66, 90 Waco Taper-Wing \$62

59 Bristol Fr. F2-B \$32, 75 Westlid Lysander \$38

78 Bristol Fr. F2-B \$44, 100 Westlid Lysander \$52

118 Bristol Fr. F2-B \$58, 57 Ford Trimtr 4-AT \$48

74 T.L. "Pesca Spec" \$56, 76 Ford Trimtr 4-AT \$60

63 Skyrocket XF5F-1 \$36, 114 Ford Trimtr 4-AT \$72

56 Cur. Warhk. P-40 \$36, 84 Berl-Joyce XFJ-2 \$52

78 Lock Lightn' P-38 \$45, 93 Loening C-2 Amph \$65

56 Rep. Sea-Bee Am. \$38, 58 Grum. J2-F Duck \$55

74 Rep. Sea-B Amph. \$50, 78 Grum. J2-F Duck \$68

106 Piper J-3 Cub \$52, 59 Gatha G-1V Bom \$32

98 Lock Hudson B'mb \$48, 117 Gatha G-1V Bom \$40

63 Grum F6F Hellcat \$40, 68 Brun-Winkle Bird \$45

90 DH 82 Tiger Moth \$52, 54 Curt Swift XP934 \$35

Not Sold Thru Dealers Prices subject to change

— AFTER PRICE INDICATES QUANTITY, ALL PLANS

Over 1200 Others, 6" - 73", All Patts. Incl. 50c Up

Add 10% to all orders for shipping & ins., etc., to

USA, Can. & Mex. Elsewhere its 15% (25% if by air)

Pictorial catalog \$2.00 (includes Price List). Price list

section alone \$1.00. If by air, foreign, add \$1.00.

**CLEVELAND MODEL & SUPPLY Co.**

EDWARD J. KACHAR—AVIATION'S BEST FRIEND—SINCE 1919

9800A DETROIT AVE. CLEVELAND, OHIO 44102

Phone Service: 11:30 am to 5:45 pm (216) 961-2600

**TIRED OF  
YOUR OLD  
PLANES? THEN  
TRY:**

**FUTURE FLIGHT**

- Klingberg Wing
- TERRIFIC TRAINER
- Plus Other Items

For catalog send 50¢ in postage to:  
**1256 Prescott Ave.  
Sunnyvale, CA 94089  
408/735-8260**

**RADAR GUNS**  
New and Refurbished



**FREE  
Catalog**

Over 20 Models  
Perfect For Any Sport  
For Performance Tuning  
Complete Rental Program  
Priced From \$395-\$1500

We Accept  
COD

**Call RADAR SALES  
(612) 557-6654**

6240 Larch Lane N., Mpls., MN 55369

## Learn to fly in Paradise!

Now you can learn to fly R/C in one of the most beautiful places on earth and make a true family vacation of your experience with **Paradise Flight School**. You'll get professional instruction and learn essential flight skills the crashless way. We guarantee you'll *return home a better pilot* and you'll be tanned and well rested to boot! Your morning flying sessions will have you back at your hotel by noon so you'll have the rest of each day to explore the exotic playground of Oahu with your wife and family.

And **Paradise Flight School** is surprisingly affordable: the cost of our weeklong program is equivalent to comparable tour packages. But it's a whole lot more fun! Call or write today for our free brochure to find out how you can become a better pilot...in paradise!

**Paradise Flight School**  
851 Pohukaina, Building C-2  
Honolulu, Hawaii 96813  
(808) 523-1545



**PARADISE  
FLIGHT SCHOOL**  
A division of Russell's R/C



## SAT-TRONICS SERVO-SYSTEM CONTROLLER

- Operate any servo, speed controller, power switch—or other R/C receiver-controlled components—without batteries or a radio.
- Allows you to analyze and evaluate all mechanical-servo control systems, including the servo itself, even in an RF interference environment.
- Manual pot control permits slow (1 degree at a time) or fast response.
- A must when doing custom work, modifications, or just checking out new and used equipment.
- High-torque regulated circuitry with auto-reset thermal-overload protection.



Operates on AC or battery. plus \$5 S&H in U.S. Visa/MC  
An AC adapter is included. Ohio residents, add 6% sales tax

**\$25**

*Guaranteed to be one of the most valuable tools you could own for R/C modeling.*

### SAT-TRONICS

2216 Grandview Ave., Portsmouth, OH 45662; telephone: (614) 353-3474.

## BOMBS AWAY!

At last, a way to make almost any R/C plane into a bomber in just seconds.

### UNIVERSAL BOMB DROP

- Attaches & releases from most R/C Aircraft in just seconds
- Can be built to drop one bomb or two bombs, together or separately
- Operates on unused channel of your radio (servo required)
- Great for funflays or R/C Wargames

**\$12.95**  
(Add \$2.00 Shipping & Handling) **KIT**  
**R/C WARGAME MANUAL**

- Explains rules & strategy
- How to build targets! Tanks, AA Guns, Bombs & more.

**ONLY \$5.95**

(Add \$1.00 Shipping & Handling)

Send Check or Money Order  
**R/C WARGAMES CO.**

P.O. Box 1121  
Mandeville, LA 70470

## YS F-120

(Continued from page 116)

pressures reached, there was no sign of that bugbear of the model 4-stroke—detonation. It was always obvious that the YS double propeller nuts would have to be tightened securely. These increasingly powerful single-cylinder impulses are always striving to free themselves from the inertia of large, heavy propellers.

When the engine had been run-in, I noticed a steady loss of power as it warmed up—more than is usual in our model 2- or 4-strokes. The cause must be loss of volumetric efficiency as the mixture is warmed when it goes through the base of the crankcase. My power and rpm figures are therefore those reached when the figures had stabilized at the lower levels. This means that, for a few seconds, higher power is available from a cold engine, but it doesn't represent the engine's true long-term power capability, so I haven't shown it here. (For those who are interested, the loss was approximately 20 ounces of torque, and 200 to 300rpm on propellers, depending on their sizes. These are only some of the overall power gains or losses implicit in any supercharging system; the overall final figure places the YS at the top of the current torque tree.)

# Get a CHARGE out of HITEC!



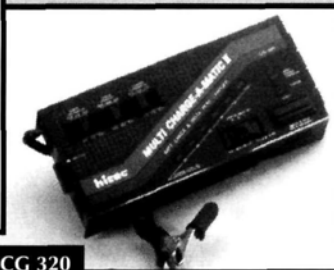
CG 72 & 84

CG72 for 6-cell (7.2v DC)  
CG84 for 7-cell (8.4v DC)  
0-30 Minute Timer  
2-Amp Taper-off Chg. rate  
12v DC-DC Operation  
10 oz, 6 1/4" x 2 3/4" x 2 3/4"



CG 315

Charges 5-7 Cell (6-8.4v)  
1200 MAH Min.-1800 MAH Max.  
Charge Rate: 3.4 Amps  
Auto-cutoff @ Full charge  
4 oz, 4 1/2" x 2 1/2" x 7/8"



CG 320

4-10 Cell (4.8-12v)  
270-1800 MAH cap.  
Programmable .9-4.5A Fast Chg.  
Auto-cutoff with C/8 Trickle  
Programmable ESV Battery Test  
"Charge Complete" Chime  
DC-DC Power Booster  
5 oz, 6 1/4" x 3" x 1 1/8"



CG 325

320 features PLUS  
Programmable Battery Cycler  
16 oz, 6 1/4" x 3" x 1 7/8"

**"One Touch" DC-DC  
Peak Chargers  
Automatic Trickle,  
Polarity Protection,  
Power, Clips &  
Cigarette Lighter  
Adapters Standard.**

**hitec™**

9419 Abraham Way  
Santee, CA 92071  
(619) 449-1112 FAX 449-1002



CG 300 (AC/DC)

Surge Protection Circuit  
Ripple-free DC Output  
Built-in Circuit Breaker  
5A, 13.5v DC Capacity  
1 1/2 pounds, 6" x 3 1/4" x 1 7/8"

Distributed in Canada by  
Hobbycraft Canada  
(416) 738-6556 FAX 738-6329

## YS F-120

### SUMMARY

Social factors regarding the use of model 4-strokes probably constrain new designs; for example, Yamada has been forced to harness the quieter, low end of the YS F-120's possible performance range. The company has certainly chosen an unusual, but successful, way of doing this, and we'll probably see its effects on other model engines. It seems that the engine's very high torque levels have led some to suggest that it produces equally high horsepower.

The YS F-120 is well-constructed, and nothing failed during my—admittedly short-term—test. The comprehensive lubrication of the crankcase base that's made possible with this design must increase reliability, particularly as torque and horsepower increase (compare this with the more sparing lubrication "suffered" by our other 4-strokes). The way is now clear for YS to explore the even more powerful lapped-piston ABC system. In short, the YS F-120 is "asking the question" about the way forward. ■

## Fireball R/C Idle-Bar Glow Plugs

Long or Short

Only \$2.09

Also...

Our Traditional line of non-idle bar Glow Plugs

- Six Types of 3 Heat Ranges
- High Performance Glow Element
- Blow Proof Seal

Only \$1.69

Swanson  
Associates  
P.O. Box 151  
Wayne, NJ  
07470



Since 1948

## TRANSMITTER TRAY

*The Choice of Champions...  
The Six Finger Advantage!*

**The L.A.W. (Land, Air & Water) Racing Products Radio Transmitter Tray: The ultimate radio transmitter tray for the flyer who needs absolute control in competition, for unqualified realism in scale flight, or simply wants to fly more proficiently.**

- ★ Fully adjustable for a comfortable fit.
- ★ Lightweight, ultra-strong KOMATEX, closed cell PVC transmitter pad.
- ★ Machined to accept all two stick transmitters.
- ★ Transmitter is safely and securely mounted on the tray by means of a retention spring and positive lock safety clip.
- ★ Shoulder straps and frame assembly machined from 6030-T52 grade, polished, anodized aluminum.



## L.A.W. RACING PRODUCTS

1229 Capitol Drive, Addison, IL 60101 (708) 543-2030



## THEY ARE THE BEST.

The design and manufacture of all Technopower II fine scale radial engines is a blend of old world craftsmanship and high technology. This combination produces engines that are powerful, reliable and quiet. You deserve the very best, and that means a fine scale radial engine from Technopower II.

5 Cylinder Big Bore Series  
26 Ounces • 1.39 Cubic Inches • 6" Diameter

## TECHNOPOWER II INC.

610 North Street, Chagrin Falls, OH 44022 • Telephone (216) 564-9787  
Complete Brochure \$3.00 • Visa & MC Accepted

©1991 TECHNOPOWER II INC.

## AIR CHAMP MODELS INC.



RRF\*, the finest concept in pre-built models

TUCANO T-27 - Aerobatic Sport Scale  
40 - 45 Eng. 2 Cycle 57 in. SPAN 40 in. Radio  
• "Superbly Finished, Great Flying Sport Scale AIR"  
Frac. Plan. Model Airplane News  
• "The Cadillac of the R/C Models"  
Nuts & Volts, Scale R/C Magazine

### Complete Detail Features:

- High Gloss Polychromatic Paint
- Flareless Fuselage
- Beck-Covered Foam Wings
- Extremely short time from Box to Air
- All Accessories and Control Rods installed, including special servo and engine mounts

Call Toll Free: (800) 247-2854 \$298.95

### AIR CHAMP MODELS

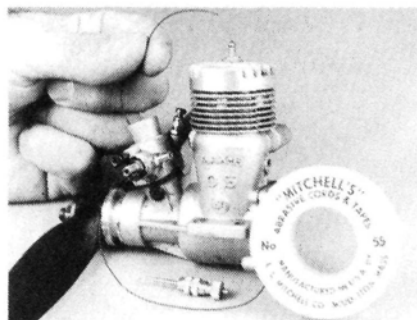
2854 N.W. 79th Ave., Miami, FL 33122  
Phone: (305) 477-1363  
Visa, Mastercard and C.O.D. Accepted





# PRODUCT NEWS

Descriptions of new products appearing in these pages were derived from press releases by the manufacturers and/or their advertising agencies. The information given here does not constitute endorsement by Model Airplane News, or guarantee product performance. When writing to the manufacturer about any product described here, be sure to mention that you read about it in Model Airplane News.

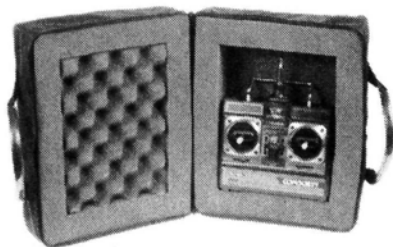


## E.C. MITCHELL CO., INC. Thin Abrasive Cords

These abrasive cords and tapes are useful not only for cleaning blocked fuel lines in model airplane engines but also for other hobby, construction and maintenance applications. Mitchell's Abrasive Cords are offered in 12 sizes (0.012 inch to 0.150 inch diameter) for cleaning holes, grooves and slots. They're impregnated with aluminum oxide, silicon carbide, or crocus (a polishing powder made with iron oxide) for ultrafine polishing. Mitchell's Abrasive Cords are supplied on handy 25-yard spools that are similar to adhesive-tape dispensers. Flat tapes in widths of 1/16 inch to 1/4 inch wide are also available.

Price: \$12/spool

For more information, contact E.C. Mitchell Co., Inc., 88-90 Boston St., P.O. Box 607, Middleton, MA 01949.



## INNOVATIVE DESIGNS Transmitter Tote

Innovative Designs' Transmitter Tote protects your R/C radio in transit and at the field. This attractive, high-quality nylon bag has web-strap handles, a

heavy-duty coil zipper, foam padding and a vinyl window for your name and channel number.

Price: \$39.95 (plus \$3.50 S&H)

For more information, contact Innovative Designs, P.O. Box 1733, Rogue River, OR 97537.



## TAILWIND AVIATION Frontier

Tailwind Aviation introduces the Frontier—a revolutionary, modular, giant-size, sport plane that will fit into your compact car! With a 101-inch wingspan, it has slow, stable flight capabilities yet, with a 3.7ci engine, it has unlimited vertical performance, and it's fully aerobatic. With the use of the plane's effective flaps, landings are at "walking speed" without any tendency to snap. This easy-to-build kit includes a 4-hour construction video, assembled wing-attachment brackets, a drilled shock engine mount, foam-core wings, 1/64-inch plywood skins, control cables, landing gear, wheel pants, hardware and all the necessary balsa.

Price: \$419.95

For more information, contact Tailwind Aviation, 4968 East Y Ave., Vicksburg, MI 49097.



## BALSA USA Stearman PT-17

Balsa USA has reached greater heights with its giant Stearman PT-17 kit. Introduced at the 1991 Toledo show, the model has a 115-inch wingspan (between 1/4 and 1/3 scale), a wing area of approximately 3,900 square inches (27 square feet) and a 26- to 30-ounce wing loading. It weighs 45 to 50 pounds and requires a 5.2ci to 5.8ci engine for power. The kit includes a spun-aluminum cowl, wheels, 4130 steel-tubing landing gear, wheel pants, a fuel tank, a tail-wheel assembly, complete hardware packages, top-grade balsa and plywood, seven sheets of well-detailed plans, a comprehensive instruction manual with photos and much more.

Price: \$699

For more information, contact Balsa USA, P.O. 164, Marinette, WI 54143.



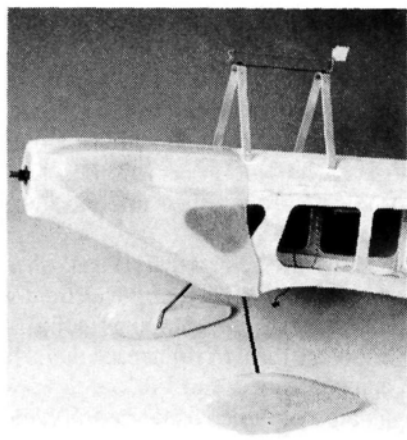
## BOB HOLMAN PLANS TBF-C1 Avenger

Bob Holman Plans announces its new semi-kit model of the plane that President Bush flew in WWII—the TBF-C1 Avenger. Sized for 90 (and up) engines, the kit features a detailed plan for a built-up model, an epoxy/glass fuselage, a cowl, a belly pan and a three-piece molded canopy.

Price: \$159.95 (plus \$20 S&H)

For more information, contact Bob Holman Plans, P.O. Box 741, San Bernardino CA 92402.

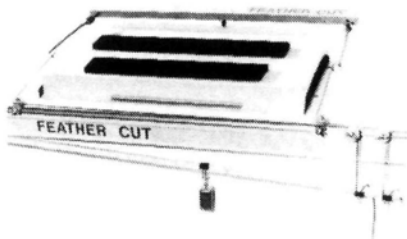




### R/C CITY Wheel Pants and Cowl

R/C City—manufacturer of fiberglass scale and pattern kits—introduces its wheel pants and cowl for the Goldberg Ultimate 10-300. They're made of pinhole-free epoxy/glass, and they're lightweight.

For more information, contact R/C City, 96 Railroad Ave. #F, Suisun, CA 94585.



### TEKOA Feather Cut Wingmachine

Now you can cut foam wings, stabs and fins perfectly every time. Selected by the 1991 USA F3B Team, Tekoa's Feather Cut Wingmachine takes the worry and waste out of cutting straight and tapered wings. It has one hot wire instead of two, and this eliminates surface ripples and trailing-edge "burn-out." It comes with complete instructions and can be attached to the front of a workbench with masking tape for easy set-up and disassembly.

Price: \$139.95

For more information, contact Tekoa: the Center of Design, 3219 Canyon Lake Dr., Hollywood, CA 90068.

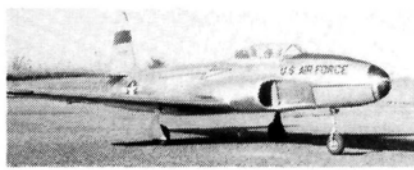


### CUSTOM CUTTER'S Diabolo Kit

In addition to providing kitting services for giant-scale modelers, Custom Cutter's is now producing its own kit line, starting with Wendell Hostetler's newest release—the Diabolo (shown). This 35-percent-scale plane has a 97-inch wingspan and a flying weight of 17 to 21 pounds. The kit comes with fiberglass parts and formed-aluminum landing gear. The second kit is of Hostetler's 26-percent-scale, 120-inch-span Cessna 206 Stationair. This partial kit includes rolled plans, and all the necessary cut pieces, sheeting and stick materials.

Prices: \$275—Diablo; \$250—Stationair; (\$10 for S&H).

For more information, contact Custom Cutter's, 4302N-750W, Ligonier, IN 46767.



### LEADING EDGE MODELS Ducted Fan T-33 "T-Bird"

Experienced ducted-fan modelers and newcomers alike will applaud the return of the highly successful, sport-scale jet model T-33 T-Bird. Redesigned from the Sterner Engineering kit, the T-33 has a 64-inch wingspan (less tip tanks), a 673-square-inch area, and it uses the popular 5-inch-diameter fans (e.g., the JMP Dynamax or the JHH Turbax III). Modelers often like to select their own wood and custom-cut their parts, and for this reason, the T-33 comes as a "Builder's Package." It includes a high-quality, pinhole-free

epoxy/glass fuselage with a separate hatch; a minimum-loss, fiberglass, inlet-dye duct; a vacu-formed canopy; cockpit-interior parts and a belly pan; full-size plans; a full-size parts template sheet; and instructions. A cut-parts package is also available as an option.

Price: \$194.95 (Builder's Package)—plus shipping

For more information, contact Leading Edge Models, 170 Oval Dr., Central Islip, NY 11722.



### HOBBY DYNAMICS JR X-347 Radio

Hobby Dynamics now offers the quality and flexibility of an X-347 PCM radio in a lower-priced FM model. The new 7-channel JR X-347 computer radio is a fully functional airplane, helicopter and glider radio all in one! Its airplane features include differential ailerons ("flaperons"), four programmable mixes, four "snap rolls," an auto-rudder dual rate and an auto-landing system. For helicopter fliers, it has four pitch curves, three throttle curves, two revolution mixes and one open programmable mix. There are also switches for throttle hold and inverted flight and three stunt/flight modes. The glider features include four programmable mixes and crow mixing and mixes for elevator to flap, flap to elevator, flap to aileron and aileron to flap.

For more information, contact Hobby Dynamics Distributors, P.O. Box 3726, Champaign, IL 61826.

## BATTERY MANAGEMENT System One



### MOSFET nicad cyclers

**\$189.95**

- The only MOSFET nicad cycler designed specifically for planes, boats and helicopters, with 3 overnight/trickle outputs capable of charging 1 to 9 cells, infinitely adjustable RX overnight charge current, the ability to discharge both RX and TX packs and a digital discharge timer.
- 3 outputs allow simultaneous or separate charging of your RX, TX and AUXILIARY (e.g. glow plug starter battery) nicads.
- Nicads will charge at the overnight rate for 17 hours and 4 minutes before automatically switching to the trickle rate.
- Adjustable control allows charging of **any** RX pack up to 2000 mAh capacity.
- TX output can discharge 8 and 9 cell packs at 300 mA. RX output can discharge 4 and 5 cell packs at 300 or 500 mA.
- True Constant Current sources are used for all charge/discharge modes.
- On power up, the BMS ONE will always come up in the overnight charge mode ensuring fully charged batteries, in the event of a momentary 110 volt power loss.
- Utilizing Current Detection Circuitry, LEDs can only illuminate when current is **actually** flowing into or out of the batteries.
- Large, digital display with anti-glare filter, shows RX and TX discharge times. Unique CAPACITY CALCULATOR will allow the milliampere-hour rating of the batteries to be determined.

Prepaid Orders: Money Order or Certified Check -  
Shipping & Handling \$5.00  
COD Orders: Cash or Certified Check collected on  
delivery. Add \$3.50 to the above amounts.

#### DEALER INQUIRIES INVITED

All Prices and Specifications are Subject to  
Change Without Notice.  
Designed and manufactured in the USA

**RK ELECTRONICS** INNOVATIVE ELECTRONICS  
BY DESIGN  
304 Fox Run, Dept 626, Hudson, NH 03051; (603) 882-6022

## AIRWAVES

(Continued from page 11)

### ON OSHKOSH

Being a loyal subscriber to your great magazine, I was looking through my past issues, and in January 1990, you had an interesting article on Oshkosh, an air show I've always wanted to attend. Could you please provide information on the 1991 show, or give me the name and address of a contact?

I'm led to believe that at Oshkosh there's an area on the edge of the airfield where one can set up camping facilities and enjoy the thrill of flight each day. I have a camper trailer, and I'd like to know the details. Are there any model plane displays or shows at Oshkosh, or is the show just for full-scale aircraft? I thank you for any help or advice you're able to give, and keep up the good work with your magazine; it's the best on the market.

ALAN N. KELSO

Niagara Falls, Ontario, Canada

The 1991 EAA (Experimental Aircraft Association) Air Show at Wittman Field, Oshkosh, WI, will be held on July 26 to August 1. For more information, contact John C. Burton, Director, Public Relations Office, Wittman Airfield, Oshkosh, WI 54903-3086.

As for campgrounds, there's an area set aside for EAA members right next to the convention center. If you're not a member, there are also local campsites. The EAA's new aviation museum has model dioramas and some static display models, but, to our knowledge, there's no R/C flying at the airshow. Have fun. GY



## FAST MOVING PRODUCTS FROM AEROTREND

THE CHOICE OF CHAMPIONS



31 Nichols St., Ansonia, CT 06401-1106 • Phone (203) 734-0600 • Fax # (203) 732-5668

### "BLUE LINE"

Silicone Fuel Line with a ★★ PLUS ★★!!!  
Why "BLUE LINE"? Here's the simple truth:

- Thicker - No more pinholes
- Stronger - Stays on fittings better
- More Flexible - Has terrific bend
- Highly Heat-resistant - No cracking or melting
- A Size for Any Application -  
from 5/64" to 3/4" i.d.

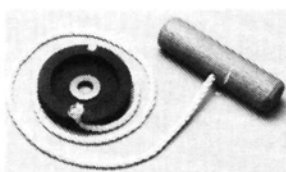
These are the reasons why "BLUE LINE" Silicone Tubing is #1 on the market today.

#### OTHER AIRCRAFT ACCESSORIES



#### AEROTREND SKID STOPS

plus "Exhaust" Stacks, "ULTRA BLUE,"  
TUNED PIPE COUPLERS, "CREAM"  
COUPLERS, "SQUEEZME" FUEL BULBS  
and more...

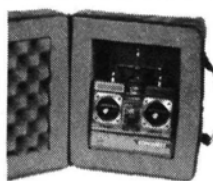


"GENTLEMEN, START YOUR ENGINES—WITH AEROSTART! Here's why:

- No charging necessary, as heavy batteries are no longer needed.
- Starts stubborn engines! If Aerostart won't start it, it's really sick.
- Aerostart is less expensive than batteries or spring starters.
- It's lightweight—can be carried in your pocket.
- A size for all engines.
- Maintenance-free!

AEROSTART will fit behind a .142 or smaller engine drive flange. For large size, installation would be in front of the propeller.

## Protect Your Radio



### THE ORIGINAL TRANSMITTER TOTE

Only \$39.95

Plus \$3.50  
Shipping & Handling

Call Toll Free To Order 1-800-845-2174

PERSONAL CHECK - MONEY ORDERS:  
INNOVATIVE DESIGNS  
P.O. BOX 1733  
Rogue River, OR 97537  
Dealer Inquiries (503) 582-4555  
ALLOW 3-6 WEEKS DELIVERY



ME 262A-1a  
Twin ducted fan  
Designed by-Tom Cook

## AIR FLAIR MFG. CO.

Box 11702  
Kansas City, MO 64138  
(816) 353-7854

Decorate your model with stars, circles, triangles, club logos or scale manufacturers' insignia—you name it! AMP Graphics are pre-spaced; alignment is ensured; and they cost so little! Try us for your AMA number or any combination of 10 letters and numbers, computer cut, 2" high (black or white) for the introductory price of \$2.95 ppd. For printed information only, send \$1 for p&h. Don't delay; inquire now; have the information when you need it! Call or write today:

1st

AMP Inc. Graphics  
36 Park Street  
Blue Point, NY 11715 516-363-5205

NYS Residents add sales tax



## AIRWAVES

### THE GAP WILL GET YA

About three months ago, I bought a Sportster .40, and since then I haven't had a chance to touch it. I've been doing a lot of thinking about my options, e.g., types of hinge, color schemes and trike/tail-dragger versions.

My main concern is the hinges. The last plane I built plowed 6 inches into the ground because my ailerons fluttered and ripped off after 7 seconds of flight. I attribute this to excessive control play and weak hinges.

Since this is only my third plane, I have little building experience. The first plane I built had pinned Du-Bro hinges, which didn't look very good because I had to drill the pinholes after I covered the model.

I can't afford to order a lot of books, and I live 45 miles from a town that may or may not have someone who could help me. I need some ideas and tips on what to do about my hinges and covering techniques. Any help would be greatly appreciated.

PHIL PERKINS  
Woodstock, IL

(Continued on page 138)

**INCORPORATED**  
914-336-8149 • 914-336-5975 FAX

F-15 EAGLE FOR  
RK-709 SPORT  
& RK-720  
\$156.99



- ULTRA - SIMPLE MODEL
- A VERY COMPLETE KIT
- BALSA COVERED FOAM CONSTRUCTION
- FORMED INLET DUCTS
- SEND FOR PLANS \$10.00; WILL BE CREDITED TO PURCHASE

DEALER INQUIRIES INVITED  
SEND FOR 1990 - 1991 CATALOG \$3.00

4308 ULSTER LANDING RD. SAUGERTIES, N.Y. 12477

PRICES SHOWN ARE LIST



BOSS 602 \$129.50  
THRUST 11.0 LB

RK709  
THRUST  
1 1/2 - 2 LB  
\$55.00



RK-740 \$109.50  
THRUST 7.0 LB

- ALL NYLON & VIVAK PLASTIC
- TRANSPARENT SHELL
- MULTI-DISPLACEMENT ENGINE APPLICABILITY
- EXTERNAL CARBS AVAILABLE
- VERY SIMPLE ASSEMBLY



RK-720 \$99.50  
THRUST 3.5 LB

## JET ENGINES AND TECHNOLOGY



**BLUE BOOK #14**  
Small jet engines catalogue: engines, spec sheets, plans, supplies. 25pp—\$5  
**THE HOME MACHINIST'S HANDBOOK**  
by Doug Briney: 288pp, 278 illustrations—\$17.95 (overseas: \$23.95)  
**HOW TO CAST SMALL METAL AND RUBBER PARTS**  
by William Cannon: 176pp, 142 illustrations—\$11.95 (overseas: \$13.95)  
**JETS**  
Jet builder's monthly newsletter  
Engineering, construction, shows—\$12/yr (overseas: \$15/yr)  
In U.S., please include 10% S&H (overseas: 20%)

**DOYLEJET**  
P.O. BOX 60311-A, HOUSTON, TEXAS 77205  
(713) 440-4744

Wingspan ..... 92 in.  
Wing Area ..... 1420 sq. in.  
Length Overall ..... 74.25 in.  
Weight ..... 18-24 lbs.  
Engine - Quadra O-35, O-40, similar  
All-wood construction; no foam used. Cowl, canopy & spinner available.



**Hawker  
Sea Fury**  
Wingspan ..... 90 in.  
Wing Area ..... 1800 sq. in.  
Length Overall ..... 81 in.  
Weight ..... 28-32 lbs.  
Engine ..... 3.4 - 4.2 cu. in.  
All-wood construction... no  
foam used. Cowl, canopy &  
spinner available.

Wingspan ..... 92 in.  
Wing Area ..... 1760 sq. in.  
Length Overall ..... 78 in.  
Weight ..... 26 - 32 lbs.  
Engine ..... 2.4 - 3.7 cu. in.  
Available in razorback or bubble.



**YALLY  
AVIATION**

Please write for more information:  
**Roy Vaillancourt**  
18 Oakdale Avenue  
Farmingville, NY 11738  
(516) 732-4715 after 6:30 Eastern time.

## MODEL AIRPLANE NEWS R/C T-SHIRT

## SHOW YOUR COLORS!

The next time you go to the local flying field, make a fashion statement with one of these new, crew-neck T-shirts from Model Airplane News! They're 100% heavyweight, preshrunk cotton and made in the USA. The time to add this super "T" to your collection of duds is now! Sizes: Small, Medium, Large, Extra Large, XX Large (\$2 more).

**Price: \$12.95**  
(plus postage and handling)\*

**Credit-card orders, call TOLL-FREE:**



**1-800-243-6685**

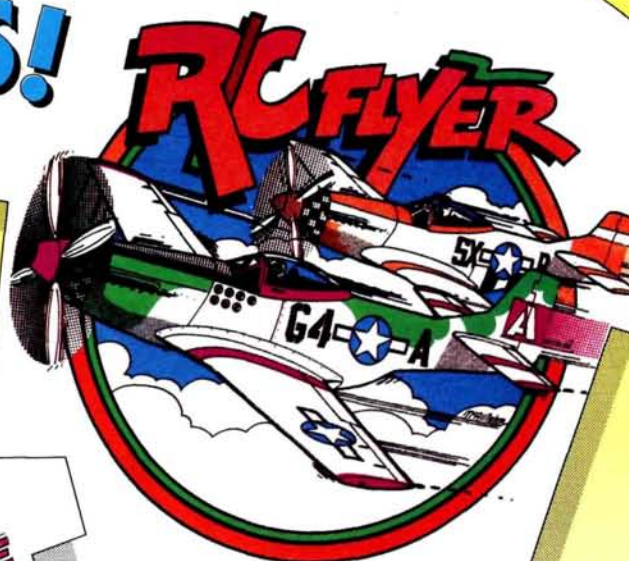
In CT: 834-2900

**Use our handy order form on page 117.**

**Air Age Mail-Order Services, 251 Danbury Rd., Wilton, CT 06897**

\*POSTAGE AND HANDLING: U.S.—add \$2.95 for first item; \$1 for each additional item. Foreign (including Canada and Mexico)—Surface mail: add \$4 for first item, \$2 for each additional item; Airmail: add \$7 for first item, \$3.00 for each additional item. Payment must be in U.S. funds drawn on a U.S. bank, or by international money order. Connecticut residents add 8% sales tax.

**BACK VIEW**





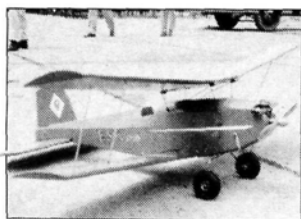
# GOLDEN AGE

## OF RADIO CONTROL

by HAL DEBOLT

### Biplane entry into aerobatic competition.

**W**HO WAS THE first flier to be really successful with biplanes? If you're wondering why I ask that, read on. The handiwork of fellow Valkyre member Bob Godfrey has been prominent at the Tournament of Champions (TOC) for several years—first with his outstanding Lasers, and in '90, with his Ultimate biplanes, which almost totally dominated the event. Then, at a local flying session, everyone praised several of the smaller Goldberg Ultimates.



Ernie Kratzet's large Eskimo biplane of the late '50s. It was powered by a .60 and controlled by a Bramco reed system.

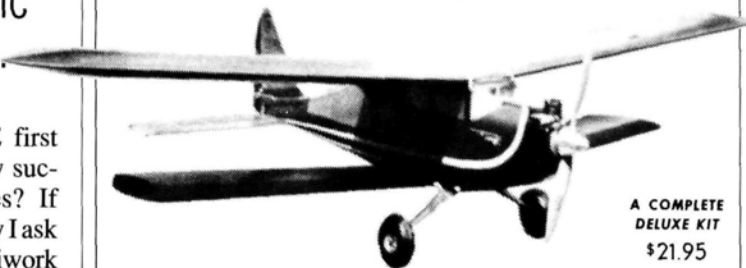
These two fine examples of aerobatic biplane design seem to be opening a new phase of pattern flying.

### THE "BIRTH" OF A BIPE

**B**ob's explanation of how his Ultimate came about is cute. He was looking for something better than the

### Custom <sup>00</sup> LIVE WIRE

A truly Spectacular Multi-Channel R/C Model!  
FOR USE WITH .25 TO .35 ENGINES AND  
2 TO 8 CHANNEL RADIOS



A COMPLETE  
DELUXE KIT  
\$21.95

*Dmeco advertised the Live Wire Custom in Model Airplane News.*

Laser for the TOC, and a biplane came to mind, but which one? Someone suggested that the full-scale Ultimate looked like nothing more than an overgrown R/C model and that it could perhaps be the best of the lot, so Bob went off to Canada. There, he carefully measured the full-scale machine, and on his return to the U.S., he simply scaled it down to a suitable model size. Talk about sophisticated model designing! (The results are obvious, of course.)

So why haven't biplanes been used in pattern competition before?—or have they? And if they were, when, how and why? The answers are interesting.

First, who had the first real success with R/C biplanes? Several names that were well-known in a particular period come to mind, e.g., Bill Northrup and his "Big John," which might have flown before the ad-

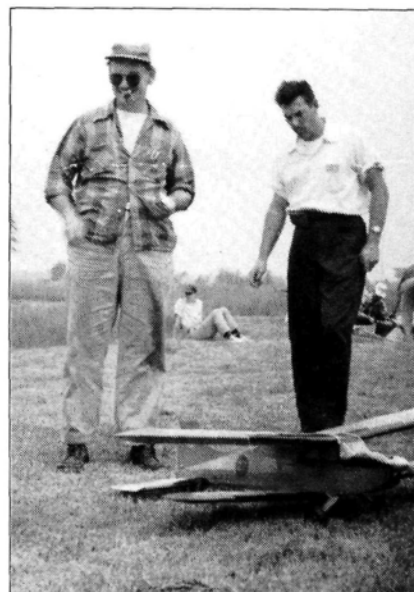
vent of real multi-channel. Big John wouldn't have been considered suitable for competition, but it showed us some fine flying. Bill followed with several other likable biplane designs.

At about the same time, the first of the fabulous Detroit Invitational meets was held. If you were there, you'll remember Ernie Kratzet and his outside Eskimo biplane. For the most part, Eskimos performed very well, but there were instances—fortunately rare!—when they didn't. If its pilot completed a loop too quickly or pulled out too quickly, the Eskimo would sometimes go out of control and do something like a Lomcevak—with

no recovery! Apparently, no one could discover the cause of this, but knowing the equipment problems of that time, someone recently suggested that the high air loads encountered with such a large model simply locked up the servos. (Seems plausible.) Apart from that, Eskimos were on a par with other designs of that period.

I competed in the Detroit meets with my Live Wire (LW) Custom—a biplane I developed specially for aerobatic competition. My experience is a good example of what was being done to solve problems and to find the most useful configuration for what became pattern competition.

At the time, competitions were dominated by Smog Hogs, LW Cruisers and comparable cabin types. You



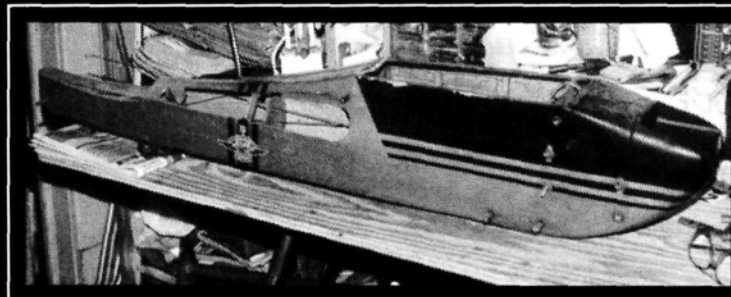
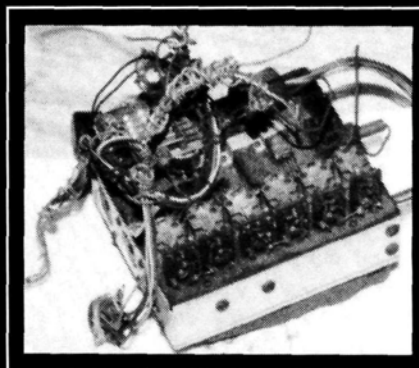
Hal deBolt and Martin Sehl wait to test-fly the first Cruiser Biplane.



# ONE FOR SHERLOCK...

**H**ave you ever gone to an antique show and had fun trying to determine the manufacturers and ages of the items displayed? It sure can get the grey cells churning!

shield, and this one doesn't. Also,



Perhaps you'd like to try it with OT R/C? Just drop me a card.

Raoul Maurice of New Orleans, LA, was given this OT R/C years ago and knows nothing about its origin. Don't even ask how an R/C Club of Chicago model wound up in New Orleans!

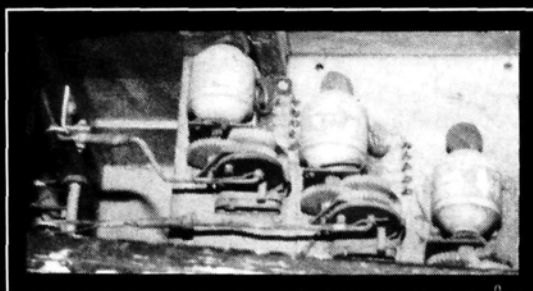
I'm not sure what it is, but I can offer some questionable suggestions. The model itself has a Live Wire "smell" to it; its paint scheme resembles a Live Wire Senior's, but the Senior had a distinctive wind-

Raoul thinks this one was powered by a "Forester 99," which would have been much too large for a LW Senior. Could it have been a Forester 29?

The R/C equipment is something else! The servos are obviously Dmeco Multi-Servos and they would have required six channels to operate. That much is sure; apart from that, the receiver is a mystery. It looks like a Schmidt, but it's a 6-channel with relays of a different brand than those

Frank Schmidt usually used. I think that a 6-channel reed system would have been *most* unusual—a good clue? (Most manufacturers jumped from five channels to eight.)

The R/C Club of Chicago decal is also a useful clue. The club was active in the '50s, so do any of the windy city OTers recognize this relic? I'm waiting for those cards!



didn't have to be Bert Rutan to realize that these weren't ideal for aerobatics, but remember that the characteristics of early multi-channels imposed restrictions that we don't have today; for example, control was neither proportional nor simultaneous. You could use only one control at a time, and models had to "fly themselves," while you guided them only when they were ready for it. Because of this, you had to fly slowly so that you'd have time to think and the model would have time to stabilize itself.

(The least power used, the better.) Also, the equipment was heavy and, lacking the ability to use power to lift, we had to design to "fly on the wing," i.e., to use a large wing area. This meant that planes had large wingspans and were flown with low power. This is very different from the "missiles" we see competing today.

## ANY BIPE BUGS?

**N**aturally, much midnight oil was burned as modelers sought a better solution. Biplanes had always been favorites for full-scale aero-

batics, so they seemed a likely choice for modelers. For one thing, their compactness is an asset when doing maneuvers, and two wings cram in a much greater wing area. They also create more drag, but the slower flight this leads to was often an asset in those days. A major concern was the complexity and heaviness of the usual cabane struts they used, but a simple alternative was the "cabin" configuration used by some of the Waco designs.

When researching biplane design, I uncovered

two factors:

● **First: wing gap.** This is the distance between the two wings, and to ensure that it wouldn't hamper the plane's aerodynamics, this distance had to be *right*. Theory said that the gap should be between one and one-and-a-half wing chords, but that a gap of as little as three-quarters of a chord would reduce a plane's efficiency only a little.

● **Second: decalage.** This is the difference between the incidence settings of the flying surfaces.

As time went on, these

## GOLDEN AGE

(Continued from page 129)

became major considerations. When you start a new project, it's a great help if you have some relevant experience. We had learned a great deal with C/L bipes, but they obviously weren't R/C! To gain experience, we simply added a LW Trainer wing to the bottom of the fuselage of an existing LW Cruiser—no other changes. This made what became known as a "Cruiser Bipe."

When we flew this hybrid, we saw a delightful improvement in performance (compared with a stock Cruiser). Maneuvers were tighter and crisper, and there was an impressive increase in rudder/roll rate. Don Waite of Pittsburgh did very well with his, and the idea seemed to spread, e.g., Al Diem of the DC/R/C added a bottom wing to his Smog Hog.

### A "TWO-THIRDS" BIPE

**A**fter this, the question was: where should we go next? During this time, with my "Over & Under" design, I had also proven the value of symmetrical airfoils for R/C. It seemed logical to combine both these new factors into one design, so I cleared the drawing board and laid out an R/C bipe from scratch. I took cabin configuration, wing gap and stagger, and the need for an efficient decalage into account.

Experience with the Cruiser bipe indicated that a useable wing area would be approximately 1,300 square inches—almost 500 square inches more than the usual monoplane. Although the Cruiser bipe performed well enough with .19 power, I



*Don Waite holds while Al Diem of the DC/R/C checks out his hybrid Smog Hog Bipe. (Note the many interested onlookers.)*

thought that increasing power wouldn't increase speed drastically, but would increase maneuverability. For this reason, I decided on a .35 engine. By using a three-quarter-chord wing gap, I kept the fuselage to a reasonable height, and by using a decent amount of stagger, I minimized the wings' interplane interference. Flights with the O&U had shown that the symmetrical airfoil performed well at a 2-degree incidence setting.

The design quickly settled into a "two-thirds" biplane; its lower wing's area was two-thirds that of the top wing. Then I had to consider decalage again. I knew the model would fly with only a top wing that was set at a 2-degree positive incidence. The bottom wing was only needed for maneuvers; it had to do nothing in level flight. If the bottom wing was set at 0-degree incidence, it would

cause minimal drag in level flight, but it would increase lift everywhere else (a good compromise).

Test flights were surprising: I found that the stabilizer *also* had to be set at a 2-degree positive incidence, and this was unheard of in those days. Having established an efficient decalage, the other design considerations were those typically associated with the Live Wire, and I chose the K&B .35 engine for power.

The new bipe's initial flights were outstanding, to say the least. Even without ailerons, all the maneuvers were neatly accomplished, so I immediately contemplated the production of a kit. Dmeco soon released the design as the "Live Wire Custom," and it was well-accepted by modelers.

The Custom bipe became my competition craft, and I built several with subtle

variations, e.g., streamlining the nose into a spinner and later adding ailerons. I flew them all with Bramco reed systems, and flew the last one with the then-new K&B .45 R/C.

They did well at competitions. At a Philly Nats, one took 2nd place—only half a point behind Dunham and his aileron-equipped Smog Hog. Later, one with ailerons did well enough at a California Nats to earn its pilot a position on the USA's first FAI World Championship team.

Strangely, other top competitors didn't use biplanes; instead, they went from high wings to low wings. I knew bipes were good, and I wasn't sure which direction to follow. Fortunately, biplanes are still with us!

Next time, I'll finish the story. Until then, don't forget this is *your* OTR/C place!



# CLASSIFIED

**Non-commercial Rate:** 15 words or less, \$4.50; additional words, 25¢ each. No charge for name and address. (No commercial ads of any kind accepted at this rate) **Commercial Rate:** 50¢ per word (applies to retailers, manufacturers, etc.); count all initials, numbers, name and address, city, state, zip code and phone number. *All ads must be paid for in advance.* To run your ad for more than one month, multiply your payment by the number of months it is to run. **Deadline:** the 10th of the third preceding month (e.g., January 10 for the April issue). We don't furnish box numbers, and it isn't our policy to send tear sheets.

SEND AD AND PAYMENT TO: CLASSIFIED ADS, MAN. 251 Danbury Rd., Wilton, CT 06897 ATTN: Laura Kidder

**ENGINES:** Ignition, glow, diesel. New, used, collectors, runners. Sell, trade, buy. Send SASE for list to Rob Eierman, 504 Las Posas, Ridgecrest, CA 93555. (619) 375-5537.

**COMPUTERIZED AIRCRAFT PLOTS:** Technical illustrations suitable for framing. Three-views. Computer scale drafting and scanning services. Turn old prints into masterpieces! Catalogue, \$1. D-TECH SYSTEMS, Rte. 2, Box 191-14, Carterville, IL 62918.

**BERKELEY, CLEVELAND, ETC.,** replica kits, duration rockets for jet models. Send three stamps to: WILLAIRCO, 2711 Piedmont Rd. NE, Atlanta, GA 30305.

**HARDWARE, SOCKET-HEAD CAP SCREWS @** excellent prices. Example: alloy socket-head cap screws 4-40x1/2, \$4.15/100; or stainless, \$5.95/100. For free catalogue, write to Micro Fasteners, 110 Hillcrest Rd., Flemington, NJ 08822; or telephone (908) 806-4050.

**WANTED:** Model engines and race cars before 1950. Don Blackburn, P.O. Box 15143, Amarillo, TX 79105, (806) 622-1657.

**DC-3 RETRACTABLE** landing gear (electric) for Ziroli and Ziroli DC-3 plans. \$250. Excellent condition! Garry Kravitz, 163 NW 98th Terrace, Plantation, FL 33324. Tel.: (305) 370-9539.

**ELECTRIC FLIGHT EQUIPMENT—***We cater to the electric flier.* The best and largest electric flight supply in the Northeast. Specializing in *AstroFlight* equipment. Kits, motors, batteries and lightweight building supplies plus everything else you need for electric flight. Send \$5 (USA), \$6 (foreign) for catalogue to CS FLIGHT SYSTEMS, 31 Perry St., Middleboro, MA 02346, or call (508) 947-2805 to order; Visa and Mastercard.

**BUILD YOUR OWN** electronic accessories. Complete instructions and diagrams for servo driver, battery tester, low-battery alarm, chargers, speed controller, etc. Send check or money order for \$9 plus \$2 S&H to: Walter Donaldson, 708 Hall, #443, Eldorado, TX 76936.

**1930s to 1950s MODEL AIRPLANE MAGAZINES:** 1930s aviation pulps, complete and good condition; \$1 for list. Bruce Thompson, 328 St. Germain Ave., Toronto, Ontario, Canada M5M 1W3.

**7-FOOT & 11-FOOT WINGSPAN—**BV138 German, three-engine flying-boat, precision-scale plans. Five sheets (7 1/2 x 3 feet). Details and photo for two stamps. Gene Falada, 22W070 Byron Ave., Addison, IL 60101.

**EMBROIDERED EMBLEMS,** enamel pins. Your design; excellent quality; free booklet. A.T. Patch Co., Dept. 68, P.O. Box 682, Littleton, NH 03561. Tel.: (603) 444-3423.

**PRECISION SCALE WHEELS & TIRES.** Custom-designed aluminum wheels, sand-cast spokes for WW II aircraft. *New, lighter tires.* Each set is not only the scale size for your individual aircraft, but it's as scale as possible in every respect. Custom orders are accepted for any aircraft. Pneumatic brakes available. *Available now:* F-105 1/10-scale and the F-100 1/10-scale: semi-kit, \$239; complete kit, \$339. Also available: struts, retracts and scale wheels and tires for all kits we manufacture. *Coming soon:* A-10, MiG 29 and F-18. For more details, call or write Glennis Aircraft, 5528 Arboga Rd., Linda, CA 95901; (800) 688-3957 or (916) 742-3957.

**START YOUR OWN HOBBY SHOP** or buy for friends or group; 30 to 60 percent off. For information, send \$1 and no. 10 SASE: R&L HOBBIES, 8620 S. Westnedge, Portage, MI 49002.

**WANTED:** kits from 1950s and '60s, especially: Monogram, Berkeley, Speedee-Bilt, Babcock, Veco, Scientific U/C, deBolt, Top Flite, Taurus and Tauri. Dr. Frank Jacobellis, 15 Highland Park Pl., Rye, NY 10580; (914) 967-5550.

**ADVANCED MODEL ROCKET KITS:** scale, futuristic and sport rockets; 1.5- to 4-inch diameter and 19 to 67 inches long. Catalogue, \$2; THOY, Department AN61, P.O. Box 467, Ypsilanti, MI 48197.

**FOUR CLEVELAND** plans with all print wood. Many back issues of *MAN, American Modeler*, others, SASE, Route 5, Box 4025, Amelia, VA 23002.

**BALL BEARINGS—**chrome steel; in stock to fit most model engines; metric or standard; Fox, K&B, O.S., OPS, Webra, YS. SASE: REVMOR, P.O. Box 548, Palm City, FL 33490; (407) 283-6831, after 5 p.m.

**MINIATURE AIRCRAFT CORP.** model kits wanted. Alan Mironer, 269 Concord Rd., Bedford, MA 01730; (617) 275-0962.

**BLUE STOPPERS SUNGLASSES—**Unbreakable; love 'em or return 'em! \$15 plus \$3.50 shipping. RCA Hobbies, Rt. 6, Box 1270, Rapid City, SD 57702.

**AERIALS, AERIALS, AERIALS—**Shoot unbelievable action video and video-assisted stills! Build our 4-ounce, color/audio, TV transmitter; under \$80. Complete plans, plus microcam and kit information, \$9.95 plus \$3 S&H. Satisfaction guaranteed. SUPERCIRCUITS, 1403-B Bayview, Hermosa Beach, CA 90254; (213) 372-9166.

**IMPORTED DIESEL ENGINES:** World's best selection: AE, AM, Aurora, Enya, FIT, KMD, MAP, Meteor, Mikro, MK, Moki, MVVS, Oliver, PAW, Pfeffer, Silver Swallow, Super Tigre and USE. Also replica Mills, MOVO and Taplin Twin diesels and rare imported glow engines and CO2 motor sets. Ten-page catalogue, \$1. CARLSON ENGINE IMPORTS, 814 E. Marconi Ave., Phoenix, AZ 85022-3112.

**VINCE MILLER DESIGNED PLANS—**1/4 exact scale Tri-Pacer PA-22, Aeronca "K," DH 80-A Puss Moth, DH-85 Leopard Moth—all for \$100 or \$29.95 each. 1/5 exact scale Piper Tri-Pacer PA-22 (71-inch span); Aeronca "K" (84-inch span); Cessna 140 (84-inch span); Piper J-3 (84-inch span)—all for \$80 or \$24.95 each. Cash or trade for ignition engines, parts and collections. Send \$1 and large SASE for giant bulletin to: Carl Miller, 130 Yucca Dr., Sedona, AZ 86336.

**WANTED:** Old unbuilt plastic model kits. Planes, military, figures, cars, promos. Aircraft or missile desk models. Send list, price. Models, Box 863, Wyandotte, MI 48192.

**R/C WORLD—ORLANDO, FL, CONDO RENTAL—**2 bedroom, furnished. Available weekly or monthly. Low rates, 100 acre flying field with enclosed hangar. Swimming pool, tennis courts on site. Minutes from Disney World and Epcot Center. For information, call Joan, (800) 243-6685, or write to Air Age, Inc., Condo Dept., 251 Danbury Rd., Wilton, CT 06897.

**WANTED:** I will buy your old, outdated R/C systems. Ron Gwara, 21 Circle Dr., Waverly, NY 14892. Tel.: (607) 565-7486.

**WANTED:** Model airplane engines and model race cars made before 1950. Jim Clem, 1201 E. 10, P.O. Box 524, Sand Springs, OK 74063; (918) 245-3649.

**PLANS ENLARGED,** Large Scale Specialists. PC Model Software. Free information. Concept, P.O. Box 669E, Poway, CA 92074-0669; (619) 486-2464.

**WANTED:** Berkeley and Cleveland kits or related items: parts, plans, boxes, brochures, books, ads, radio equipment, accessories, etc. Gordon Blume, 4649-191st Ave. S.E., Issaquah, WA 98027.

**GIANT SCALE PLANS** by Hostetler. We fly what we draw. Send SASE to Wendell Hostetler's Plans, 1041 B Heatherwood, Orrville, OH 44667.

**ANTIQUE IGNITION AND GLOW PARTS CATALOGUE:** 100 pgs., timers, needle valves, original cylinder heads, point sets, drive washers, stacks, spark plugs, plans. Engines: Atwoods, Baby Cyclones, McCoys, Hornets, others. \$8 postpaid U.S., Foreign \$20. Chris Rossbach, R.D. 1 Queensboro Manor, Box 390, Gloversville, NY 12078.

**SCALE MODEL RESEARCH** Aircraft Documentation. World's largest. Over 3,000 different Foto-Paaks and 10,000+ drawings. Catalogue \$4. 2334 Ticonderoga, Costa Mesa, CA 92626 (714) 979-8058.

**INTERNATIONAL AIRCRAFT RESEARCH—**Need documentation? Include name of aircraft for availability of documentation with \$3 for 3-view and photo catalogue. 1447 Helm Crt., Mississauga, Ontario, Canada L5J 3G3.

**HELICOPTER SCHOOL:** 5 days of hands-on instruction with X-Cell Helicopters and Futaba computer radios. Small classes, tailored to your individual needs. Beginner to expert. Includes all meals and lodging. Over 80 satisfied students and 2,600 flights logged in our first 8 months of operation. Located on a 67-acre airport used exclusively for R/C training. Owned and operated by Ernie Huber, five-time National Helicopter Champion and helicopter designer. Winter and spring classes run January 7 through June 21. Write for free information and class schedule now to R/C Flight Training Center, P.O. Box 727, Crescent City, FL 32112-0727, or call (904) 698-4275.

**OLD-TIMERS,** take a ride back in time to airplane modeling roots with this vintage book—*Gas Models*. A true collector's book from the early editors of *Model Airplane News*, it contains the best of modeling from the '30s and '40s, including great technical information and classic construction articles from the Golden Age period. \$7.95, add \$2.95 S&H for first item; \$1 for each additional item. *Foreign:* (including Canada and Mexico)—*surface mail*, add \$4 for first item, \$2 for each additional item; *airmail*, add \$7 for first item, \$2.50 for each additional item. Payment must be in U.S. funds drawn on a U.S. bank, or by international money order. Connecticut residents add 8% tax. Air Age Mail-Order Service, 251 Danbury Rd., Wilton, CT 06897.

**HUGE "ATOMIC EXPLOSION"—**1990 "Striking Back" Air Show, Ida Grove, IA. PT boats, flat tops, tanks, big napalm attack, fireball explosions, dozens of R/C aircraft in the air, Battle of Iwo Jima. Ride with us in a 1931 Stinson Tri-motor. Best air show in the Midwest...crisp stereo Hi-Fi sound; VHS 45 minutes. \$20, add \$3 S&H per order (USA). Short on cash? Credit cards welcome: Visa/MC, check, money order. (Iowa residents add 4% sales tax). Orders: (515) 277-7218; CHU-CHU Video Productions, P.O. Box 762, Des Moines, IA 50303.

# NAME THAT PLANE

## CAN YOU IDENTIFY THIS AIRCRAFT?

If so, send your answer to Model Airplane News, **Name that Plane Contest** (state issue in which plane appeared), 251 Danbury Rd., Wilton, CT 06897.

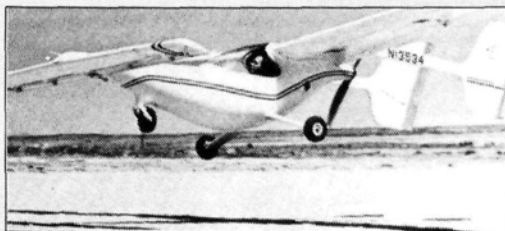


**C**ONGRATULATIONS to Valerie Gossert of Litchfield Park, AZ, for correctly identifying the Applebay Zia—the plane featured in our May contest. With its 250cc, single-cylinder, Fuji Robin 18hp engine the Zia can get into the air more cheaply than any other sailplane/towplane combination. Its empty weight is 300 pounds; gross weight is 550; and wing loading at gross weight is only 4.4 pounds per square foot, which gives a lift-over-drag ratio of 27:1.

Final production versions have ailerons, fore-plane elevator and rudders that are coupled to the nose gear. The plane can be bought for about \$12,000, but if that exceeds your budget, how about trying the kit? It's reported to be highly prefabricated: just assemble the molded parts—something you're all

familiar with. Applebay advertises the craft as being for the person who wants something "less primitive than an ultralight but who doesn't want, or can't afford, a full-size airplane." Any takers?

**Editor's note:** we're sure that many of you are now busily writing to us about why we named April winners on the Abram's Explorer in both the June and the July issue. For some time, we've been getting more than the usual bunch of answers—especially well-researched ones—after we've moved on to the next issue. So we've decided to start skipping two months instead of one to give readers more time to send in their answers. To do this, we needed to buy a month; hence, the dual award.



familiar with. Applebay advertises the craft as being for the person who wants something "less primitive than an ultralight but who doesn't want, or can't afford, a full-size airplane." Any takers?

The winner will be drawn four weeks following publication from correct answers received (on a postcard delivered by U.S. Mail), and will receive a free one-year subscription to **Model Airplane News**. If already a subscriber, the winner will receive a free one-year extension of his subscription.

**KNOWLEDGE IS POWER. SUBSCRIBE TO MODEL AIRPLANE NEWS TODAY. CALL 1-800-435-0715.**

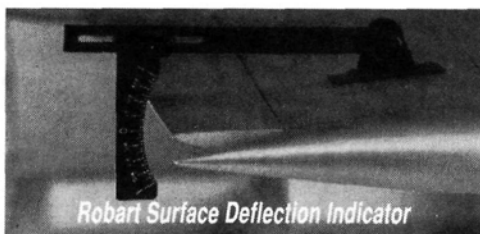
## "Meter, meter, problems eater."

*Accurate Robart aircraft alignment tools mean fewer failures, more fun!*



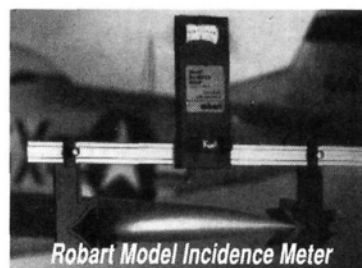
**Robart Helicopter Blade Pitch Meter**

THE precision instrument designed to accurately measure the relationship between rotor blade and flybar. Allows for precise set-up of collective inputs at any location. Offers more features and greater accuracy than more expensive meters.



**Robart Surface Deflection Indicator**

The accurate way to measure the travel of elevator, aileron flaps and rudder. Attaches easily to flying surface and precisely measures surface deflection. Allows for more accurate differential adjustments. Fits large and small scale aircraft.



**Robart Model Incidence Meter**

The #1 meter for setting proper thrust, wing and stabilizer incidence. Readies new models for accurate flight and helps diagnose why other models operate less than their best. Fits any wing, tapered or straight. Fine tunes to 1/8 degree.

*Reach for* **robart**

At Hobby Dealers Nationwide  
P.O. Box 1247 St. Charles, IL 60174 708-584-7616

© ROBERT MFG. 1990



# CLUB OF THE MONTH



## CLUB OF THE MONTH WINNER

### Madison Area Radio Control Society

c/o Gerard Bakker 7630 Farmington Way  
Madison, WI 53717

**N**ovice modeler/fliers can find plenty of good advice in the May '91 issue of MARCS SPARKS—the monthly newsletter of the Madison Area Radio Control Society, Madison, WI. Judging from its newsletter, this club goes to great lengths to start its beginners off well. As a service to its less experienced members, the club recommends radios, engines and kits (powered and glider), and a thorough training program is available.

MARCS uses a well-designed system that's similar to the FAA's private pilots training system. For a fee of \$20, MARCS students receive progress record cards that they must take to 15 instructional sessions (30 to 45 flights). These cards help the students chart their progress through the training period, and there's also room for instructors' comments.

Although it has basic support equipment available to help students, the club encourages them to buy the right equipment for building, adjusting and flying their own models. With so much guidance, the students are less likely to spend their time making mistakes! The students are also encouraged to attend on "instructor Saturdays," when they can practice with instructors without being graded. A student's training program is complete when he can meet the requirements of the Flight Proficiency Program Level 1, with his own equipment, in the presence of two MARCS instructors. A Level 1 pilot is allowed to fly without supervision at the club's field.

The Flight Proficiency Program is divided into five levels, and a pilot can teach anyone in a lower level. This provides the less experienced fliers with ample instruction; it keeps the accomplished pilots on their toes; and it gives everyone involved something to strive for.

For their hard work and dedication to pilot training and development, we give two subscriptions to our newest "Club of the Month." Congratulations, and good work, MARCS!

# MODEL AIRPLANE NEWS TRAINER PAK™

SAVE  
\$5.00!

*Here's a great deal that will dial  
you in to the world of R/C airplanes!*

**THE MODEL AIRPLANE NEWS ANNUAL** contains the year's best articles from our monthly issues. It features many "how-to" and technical articles, including those on engine troubleshooting, covering, prop efficiency, sport-scale techniques, floatplane basics, repairing ARFs, electric-airplane basics, weathering techniques, plus a slew of other modeling tips.

**THE BASICS OF RADIO CONTROL AIRPLANES** is the most comprehensive and up-to-date beginner book available. It takes you step by step through the basics, including trainer airplanes, radios, hardware, tools, servos, balance and trim, support equipment, center of gravity, preflight, repairs, maintenance and much more. This is the definitive book for fledgling fliers!

**THE 1991 RADIO CONTROL AIRPLANE BUYERS' GUIDE** contains 250 pages of R/C airplanes, ARFs, sailplanes, electrics, helicopters, radios, engines, hardware, field equipment, paint and tools—and tons more! It puts the entire R/C airplane marketplace at your fingertips!

We're offering these 3 great R/C books at a single, special, low price of only **\$13.85** (plus postage and handling) \*—a savings of **\$5.00!** Here's a guaranteed way to start getting R/C smart—fast!

**Order your TRAINER PAK today!**

**Credit-card orders, call TOLL-FREE:**

**1-800-243-6685**

In CT: 203-834-2900

\*POSTAGE AND HANDLING: U.S.—add \$2.95 for first item, \$1 for each additional item. Foreign (including Canada and Mexico)—Surface mail: add \$4 for first item, \$2 for each additional item; Airmail: add \$7 for first item, \$3.00 for each additional item. Payment must be in U.S. funds drawn on a U.S. bank, or by international money order. Connecticut residents add 8% sales tax.

AAA1

• AIR AGE MAIL-ORDER SERVICES, 251 DANBURY RD., WILTON, CT 06897 •



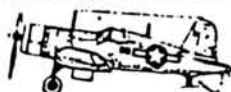
USE OUR HANDY ORDER  
FORM ON PAGE 117.

## Catalogs:

Best in Scale \$5.00  
Model Aircraft Plans Handbook 1990-91 \$5.00  
Scale Drawings Plans Handbook \$5.00  
RC - Model World Plans and Const. Guide \$5.00  
Catalogs are \$4.00 ea. when 3 or more are shipped together or with an order.  
BOB HOLMAN Kits: Call (714) 885-3959  
New 138 pg. GERMAN PLANS BOOKS  
\$6.00 With Other Catalogs

Please add \$2.00 if Shipped Separately

## THE BEST IN SCALE Over 25 Years Of Service



Winners at Toledo - Master Internats & many more

Plans - Epoxy  
Glass Kits  
Scale  
Documentation  
British Magazine  
Plans

VISA/ MC

Bob Holman, Box 741, San Bernardino, CA 92402

## SCALE PILOTS

Civilian busts in 1/3, 1/4 and 1/5 scale are \$7.95 plus \$3 P/H. Full figures are \$19.95 plus \$4 P/H. Civilians in 1/3, 1/4 and 1/5 scale; WWI (Barnstormer) in 1/4; WWII Navy in 1/5; WWII USAF in 1/6 and 1/8 scales.

Ask for **Officers and Gentlemen** pilots by name at your favorite hobby shop, or call for the name of the dealer nearest you. If ordering direct, include check, money order or MC/VISA account number and exp. date.

**Officers and Gentlemen • (908) 537-7323**  
Box 537, RD 2, Hampton, NJ 08827



## ADVERTISER INDEX

Ace R/C	106
Aeroglass R/C Flight Academy	127
Aerotrend	124
Air Champ Models	119
Air Flair Mfg.	124
Airtronics, Inc.	4
Altech Marketing	C2,48
AMA	73
America's Hobby Center	100
AMP Inc. Graphics	124
Badger Air-Brush	126
Basics of R/C Airplanes	79
Basics of R/C Helicopters	94
Basics of R/C Sailplanes	70
Bob Holman Plans	135
Boca Bearing Co.	97
Byron Originals, Inc.	23,50
Carden Corporation	138
Carl Goldberg Models	36
Century Import & Export	97
Classified Directory	131
Cleveland Model and Supply Co.	116
Coverite	138
Composite Structures Technology	113
Cox Hobbies	56-57
Custom R/C Graphics	78
D.C. Model Aircraft	107
Dickybird models	107
Don Smith	78
Doylejet	128
DuBro Products	30
Ernst Mfg.	127
Fox Manufacturing	8
Futaba Industries	C3
Future Flight	116
G and P Sales	115
G.M. Precision Products, Inc.	83
Great Circle Hobbies	126
Great Planes Models	15,C4
Historic Aviation	13
Hitec	118
Hobbico	28,55
Hobby Lobby International	82,83
Hobby Shack	26-27
Hobby Shop Directory	126
Innovative Designs	124
Innovative Modeling Products	97
John Sullivan	115
JR Remote Control	38
K&B Manufacturing, Inc.	78
K&S Engineering	78
Kress Jets, Inc.	125
Kyosho	90
Landing Products	10
L.A.W. Racing Products	119
M.A.N. Back Issues	120-121
M.A.N. Books	136-137
M.A.N. Decals	127
M.A.N. Design Contest	21
M.A.N. Plans	132-133
M.A.N. Posters	89
M.A.N. Prints	62
M.A.N. T-Shirts	125
M.A.N. Trainer Pak	135
Mail-Order Form	117
Midwest Products, Inc.	11
Miniature Aircraft USA	92
Model Products Corp.	114
Officers & Gentlemen	135
O.S. Engines	67
Pacer Technologies	138
Paradise Flight School	116
Radar Sales	116
R/C Airplane Building Techniques	35
R/C Airplane Buyers' Guide	68
RCD	7
R/C Products Unlimited	116
R/C Systems	86
R/C Wargames	118
Retailer	99
RK Electronics	124
Robart Manufacturing	134
Robbe Model Sport	77
SAT-TRONICS	118
Scale Aircraft Drawings WWI & WWII	107
Seacoast Aerowagon	8
Sermos R/C Snap Connectors	106
Sig Manufacturing	18-19
Sky Aviation	9
Slimline Manufacturing	113
Smithy	114
SR Batteries	115
Swanson Associates	119
Tatone, Inc.	114
Technopower II, Inc.	119
Teleflite Corporation	18
Top Flite Models	3
Top Gun Aircraft	83
Tower Hobbies	80-81,103
U.S. Air Core	106
Vailly Aviation	125
Watkins Aviation, Inc.	126
Williams Brothers, Inc.	114
Young Engineering	116

# If you're not using Zap Lock,<sup>TM</sup>



## you may as well kiss your nuts goodbye.

### ZAP LOCK<sup>TM</sup>



The ultimate  
thread-locking  
compound.  
Works on  
metal, wood,  
plastic or any  
combination of  
surfaces.

Available  
in medium  
(blue label)  
and high  
(green label)  
strength.

# ZAP

"THE TOTAL ADHESIVE SYSTEM"<sup>TM</sup>

Pacer Tech  
California USA

IRON temps  
vary every  
day. Stop  
guessing &  
buy a handy  
Pocket  
Thermometer.



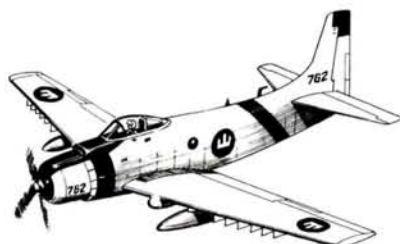
## COVERITE



## AIRWAVES

(Continued from page 125)

Phil, your problem and subsequent crash probably weren't because of the hinges. Currently available hinges work well. The most important thing to watch is the gap at the hinge line; i.e., the distance between the control-surface's leading edge and the trailing edge of the fixed surface to which it's attached. Too much of a gap here decreases the efficiency and effectiveness of the control surface, and it will also cause the dangerous flutter that "did in" your plane. Models with too large a gap can be corrected by filling or bridging the gap with a strip of iron-on film to stop the excessive turbulence caused by this space. CC



### CARDEN Quality

in the kit • in the air

PAYDIRT 60

SALE  
\$99<sup>95</sup>

LIST  
\$139<sup>95</sup>



SIDEWINDER

SALE  
\$84<sup>95</sup>

LIST  
\$119<sup>95</sup>



MAVERICK 40

SALE  
\$79<sup>95</sup>

LIST  
\$114<sup>95</sup>



GAMBLER 40

SALE  
\$79<sup>95</sup>

LIST  
\$114<sup>95</sup>



Ask to see it at your local dealer!

If not available, order direct from CARDEN  
1731 N.W. Madrid Way • Boca Raton, FL 33432  
Call Anytime • 407-367-7744 • Free Catalog  
MasterCard and VISA Accepted